PERIODICAL DIVISION
JUL 26 1937

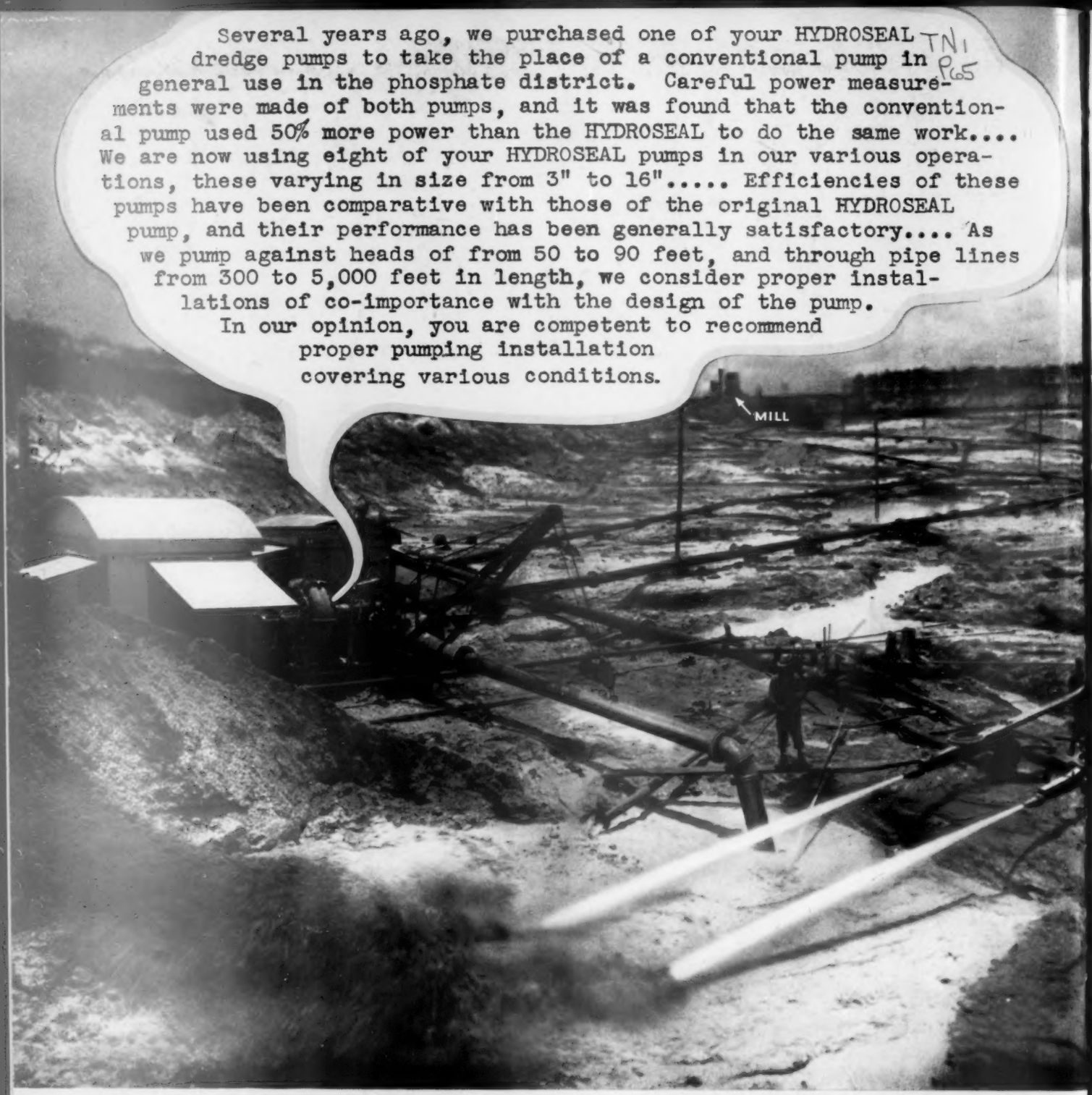
PIT AND QUARRY

JANUARY, 1937

Annual Review of the Nonmetallic-Minerals Industries . . . Erecting All-Concrete Cement-Plant Structures in Winter . . . Producing Aggregates at Bonneville . . . The Memphis Conventions

Several years ago, we purchased one of your HYDROSEAL dredge pumps to take the place of a conventional pump in general use in the phosphate district. Careful power measurements were made of both pumps, and it was found that the conventional pump used 50% more power than the HYDROSEAL to do the same work.... We are now using eight of your HYDROSEAL pumps in our various operations, these varying in size from 3" to 16"..... Efficiencies of these pumps have been comparative with those of the original HYDROSEAL pump, and their performance has been generally satisfactory.... As we pump against heads of from 50 to 90 feet, and through pipe lines from 300 to 5,000 feet in length, we consider proper installations of co-importance with the design of the pump. In our opinion, you are competent to recommend proper pumping installation covering various conditions.

TN1 P65



THE ABOVE is an exact copy of a letter received from the manager of a world-famous mining company. Obviously, there is no reason why you can't obtain comparable economies. The sand matrix mined by this company is conceded to be a "tough" material to pump. The two Hydroseal Dredge Pumps illustrated produce a vacuum of 26" on the suction end without noise, hammering or vibration and convey the matrix to the distant mill. This unit has been in service for over two years. Send for a copy of our new, complete, twenty-four page Catalog No. 1-836, describing Hydroseal Dredge Pumps; also Sand, Sludge, Slime and Slurry Pumps.

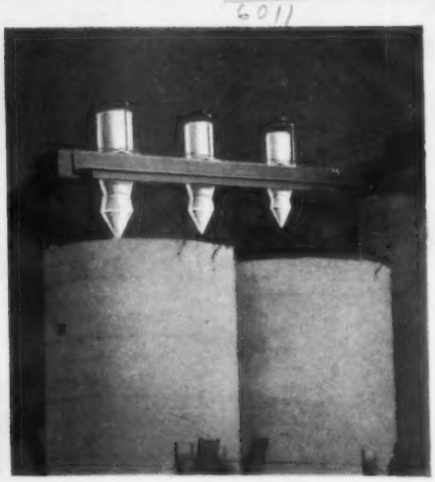
HYDRO SEAL

Dredge Pump *MAXIMIX* Protected

HYDRO SEAL AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD

The ALLEN-SHERMAN-HOFF CO. · 221 South 15th Street · PHILADELPHIA, PA

OFFICES AND REPRESENTATIVES IN MOST PRINCIPAL CITIES



For Better Grading and Washing — in 1937

● Link-Belt designs for sand, gravel, stone handling and preparation equipment, embody the ultimate in economy and flexibility of layout. The individual elements . . . including the driving units . . . have been thoroughly standardized. Link-Belt's engineering experience applies these standardized units according to the specific needs of the plant where the installation is to be made.

Send for Catalog 1240. Address Link-Belt Company, Chicago, Philadelphia, Indianapolis, Atlanta, San Francisco, Toronto, or any of our other offices located in principal cities.

5011

LINK-BELT HANDLING AND PREPARATION EQUIPMENT

PIT AND QUARRY, January, 1937. Vol. 29, No. 7. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price: $2 for 3 years, $1 for 1 year in the U. S. and possessions, Canada, and Central and South America; elsewhere $1 additional for each year. Single copies 20 cents. Entered as second-class matter November 28, 1932, at the Post-Office at Chicago, Ill., under the Act of March 3, 1879.

YOU TOO CAN SAVE ON WIRE ROPE

Many contractors who formerly found their wire rope costs running high are today reducing this expense. They have learned that a wire rope gives economical service only when it is EXACTLY suited to the work it is to do. Accordingly, they use only that rope which is of correct construction, grade of steel, and size — for *each* duty on *each* machine.

After studying actual operating requirements, UNION Wire Rope Engineers have developed the *strictly correct* ropes for all of the machines used by contractors. Field records prove that UNION Wire Ropes give exceptionally low-cost performance when used in accordance with the recommendations of our Engineers.

UNION Wire Rope Engineers will gladly answer inquiries regarding the most economical ropes for your machines. Write or phone our general or district office.

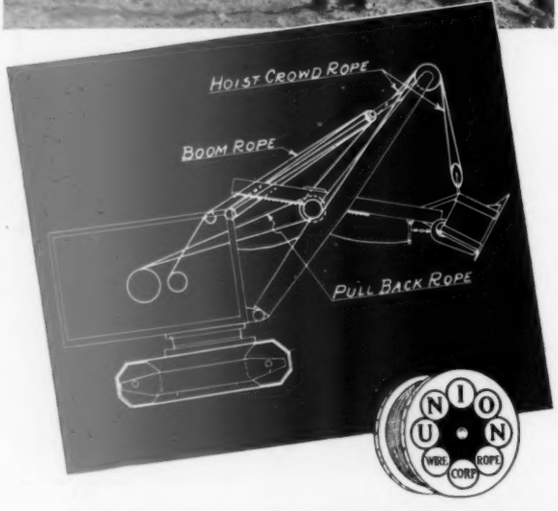


Diagram shows the wire ropes used on Revolving Shovels. Different makes of shovel have different rope requirements. In writing for recommendations of our Engineers give full classification data covering each machine you are using.

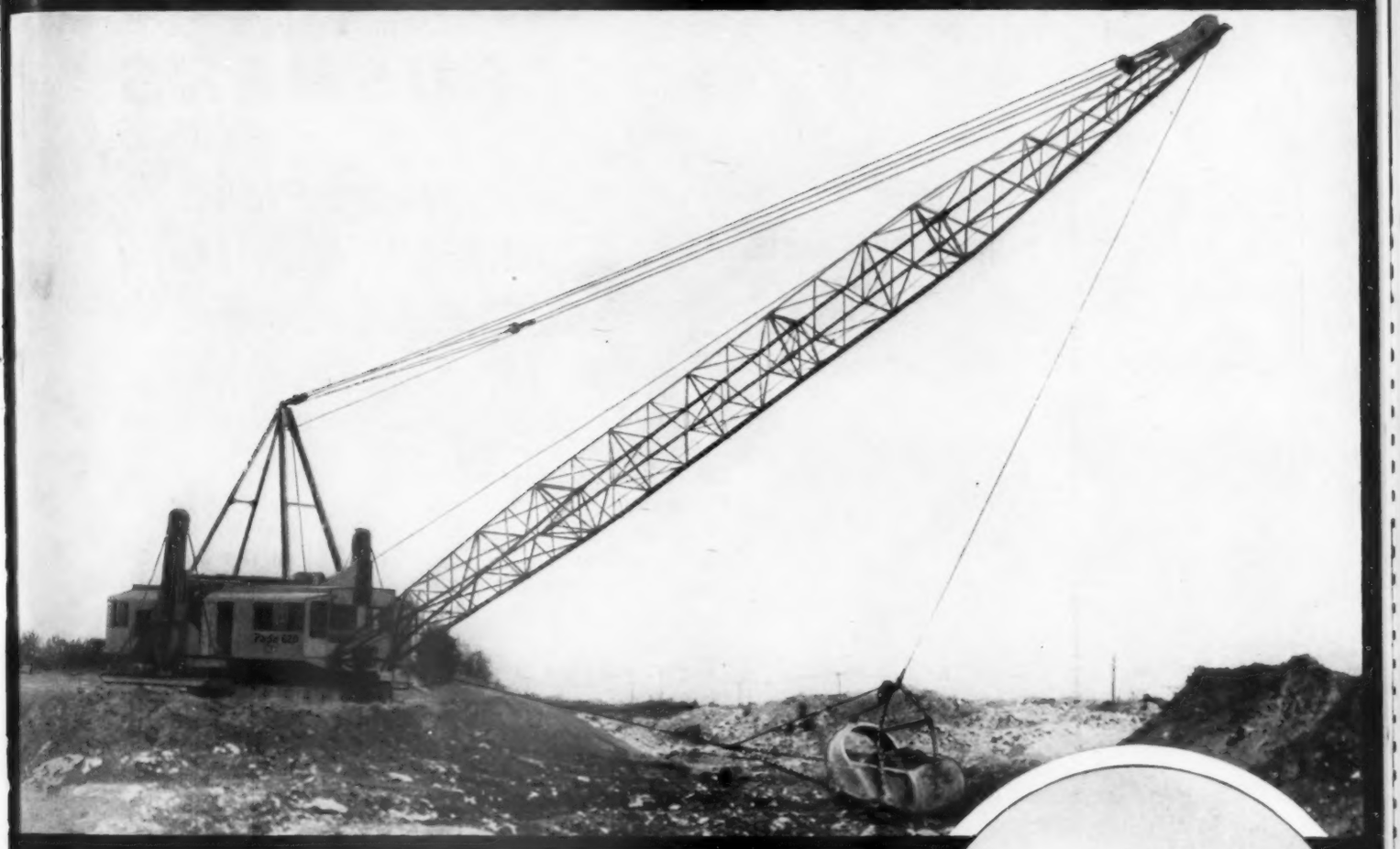
UNION WIRE ROPE CORPORATION

General Office and Factory: 21st and Manchester, Kansas City, Mo.
Chicago District Office: 53 W. Jackson Blvd.
Chicago Warehouse: 1729 W. 74th St., Telephone Harrison 8700
Portland, Ore.: 2415 N. W. 22nd Ave.
In Mexico: E. O. Chapa, Calle Damas Sur 13, Tampico—Madero 2, Mexico, D. F.
Export Agents: Lucey Export Corp. (Exclusive)
3505 Woolworth Bldg., N. Y. Broad St. House, London, E. C. 2, England
Distributors in Leading Cities throughout the Country

UNION WIRE ROPES

The "ULTIMATE LOW COST WIRE ROPE"

Page High Yardage WALKING DRAGLINE



Moderately Priced—Three to Five Yard Machines Immediately Available

Diesel powered—by a heavy duty horizontal engine designed particularly for dragline use.

High—load—hoist—and swing speeds.

Large circular base. Machine can work on the softest ground without mats or danger of miring down.

Fairlead, drums, and sheaves designed to reduce cable wear.

Simple positive crank action walking mechanism, moves machine on the softest ground, walks immediately in any direction three steps per minute. Reduces machine's original cost.

Before buying any dragline, learn what the Page Walker can do on your job! For information write—

PAGE ENGINEERING COMPANY
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Please send information on a Page "600" Walker. Size _____

Name _____

Address _____

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Page Engineering Co.

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PAGE AUTOMATIC DRAGLINE BUCKETS
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For Sand and Gravel Producers!

UNIVERSAL CRUSHERS

Portable Plants And All Auxiliary Equipment

Thirty years of specialized effort is represented in the now complete Universal line of Crushers, Pulverizers, Stationary and Portable Crushing and Screening Plants, Washing Plants, Screens, Feeders, Bins, Elevators, Conveyors, and other accessory equipment for *low cost, high speed crushing, screening and handling.* Each Universal unit is tested and proved—each design the result of intelligent field study, interpreted into rugged, long life equipment.

Universal designs are modern—roller bearings—the use of impact and abrasion resistant manganese steel—oversize parts—accessibility—quick and easy renewal of wearing parts—everything is provided by simple installation, fast operation, long time service, *and lowest cost per ton handled!*

Many units in the broad line of Universal Crusher Equipment are carried in stock for immediate shipment—others can be rapidly assembled from standard parts on hand—*Universal delivery is prompt!* Wearing parts, jaws, side plates, roll shells, etc., are stocked for every size and type of equipment we make; each part jig finished to facilitate quick, easy installation. Genuine Universal parts save time and money for Universal users.

No matter what your crushing, pulverizing and handling problem may be—demand Universal Equipment for *better, longer, most satisfactory service!*

"Meet us at New Orleans, Booth C-27!"

ORIGINAL FORCE FEED UNIVERSAL CRUSHER

CRUSHERS
STATIONARY AND PORTABLE PLANTS
PORTABLE WASHING PLANTS
PULVERIZERS
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No crushing equipment line is as complete—as simple in design—as easy to operate—or as long-lived as Universal. Sold by leading equipment distributors everywhere!

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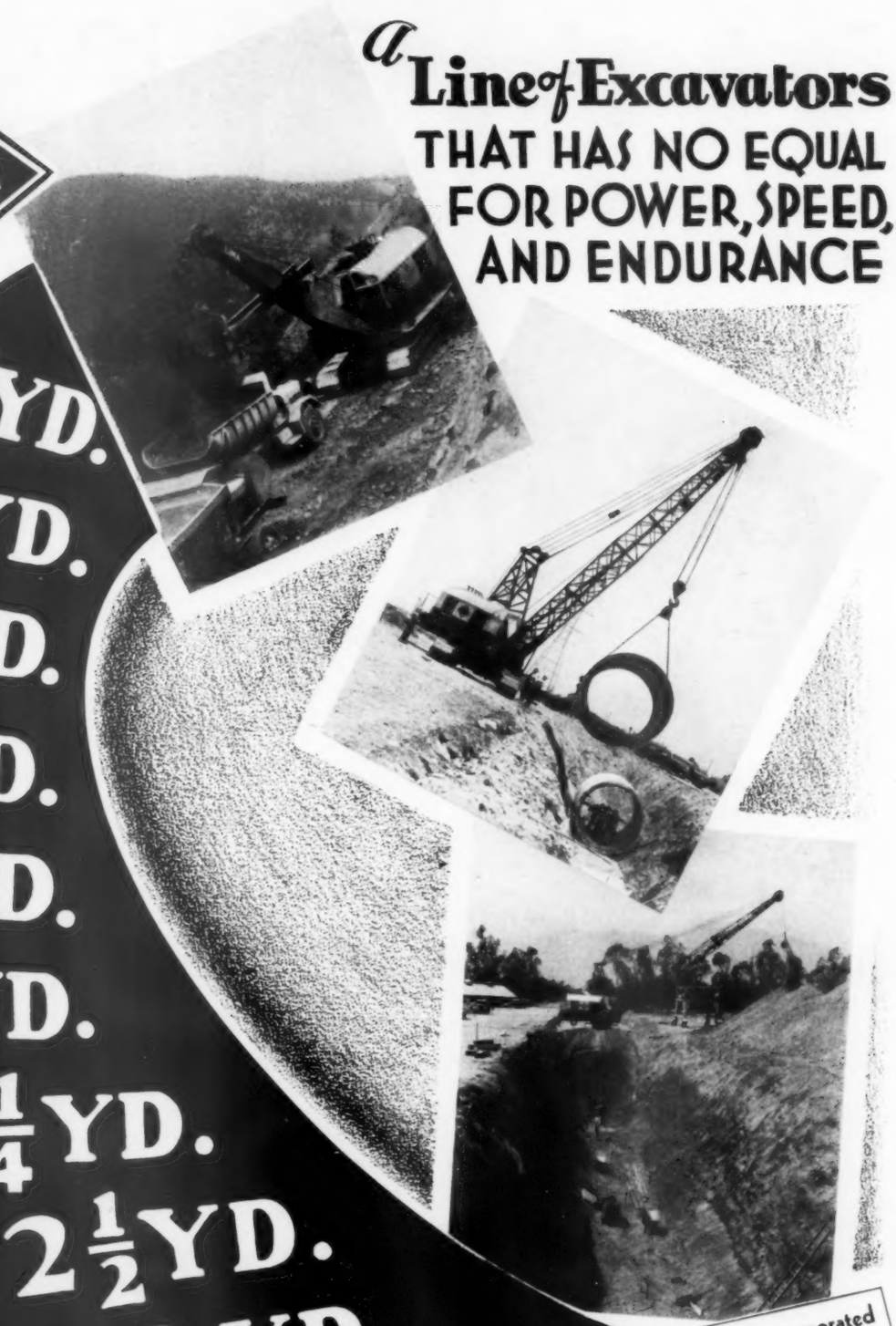
LIMA

A Line of Excavators THAT HAS NO EQUAL FOR POWER, SPEED, AND ENDURANCE



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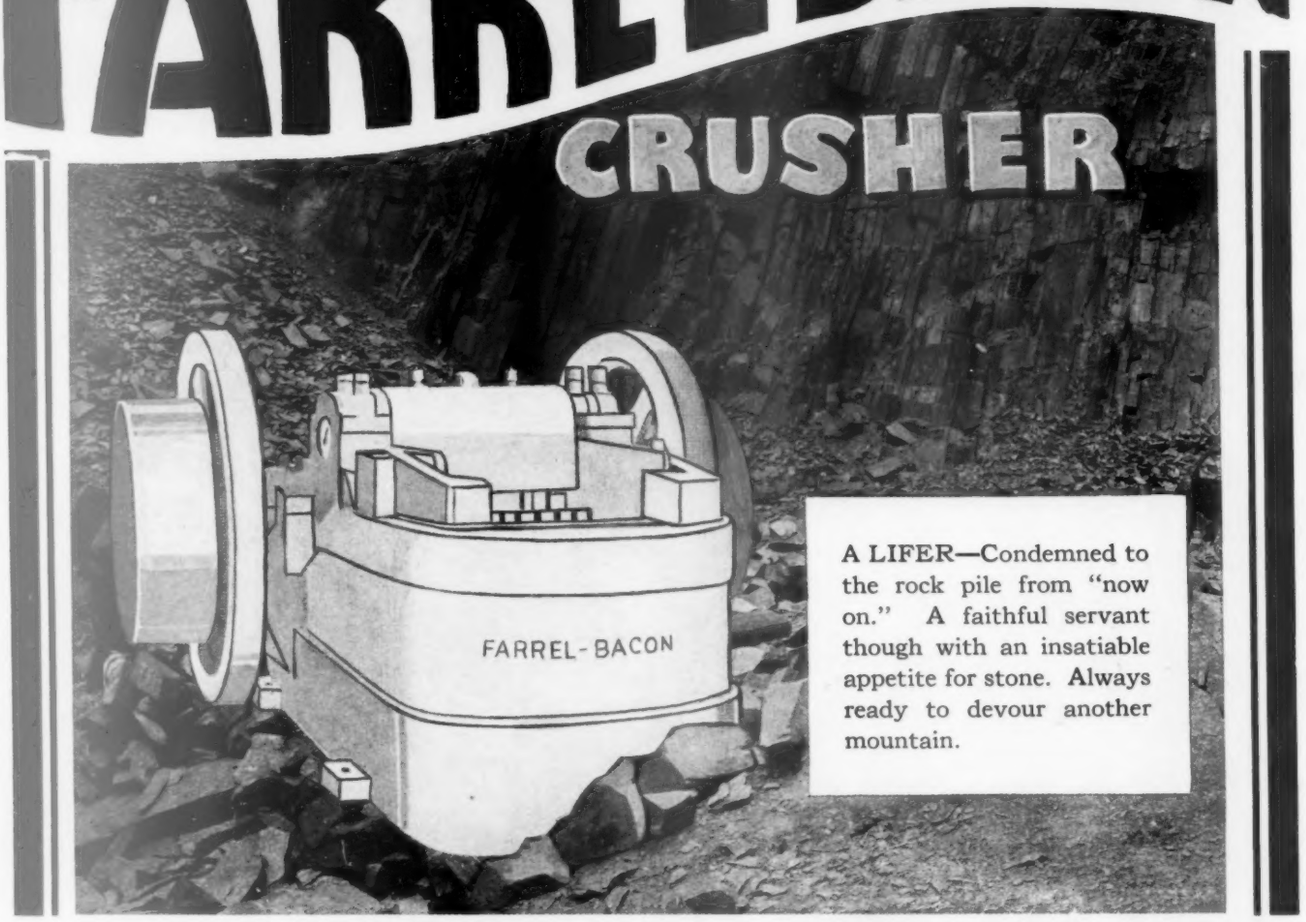
FARREL-BACON CRUSHER



A LIFER—Condemned to the rock pile from "now on." A faithful servant though with an insatiable appetite for stone. Always ready to devour another mountain.

A MOST PROFITABLE INVESTMENT

Where the crushing is toughest you'll find a Farrel—Regardless of whether it is new or thirty years in service, it will do the job every day, all day, year after year. These tough, rugged Crushers, backed by fifty-seven years of actual experience, will outlast a lifetime!

Foresighted operators know that investment in expert knowledge of design and equipment earns greatest dividends. Today many of the foremost operators of the rock products industry have insured their success by utilizing Bacon engineering service and Bacon quarry equipment.

BACON SUPPLIES THE FOLLOWING EQUIPMENT

Breaker-secondary crushers, Reduction units, Laboratory crushers. Friction type roller screens. Vibrating screens. Belting. Bucket type elevators. Chutes. Complete crushing plants. Conveyors. Crushing rolls. Drives. Feeders. Gears. Screening plants. Scrubbers for sand, ore, and gravel. Speed reducers, etc.

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Engineers to the Stone Crushing Industry

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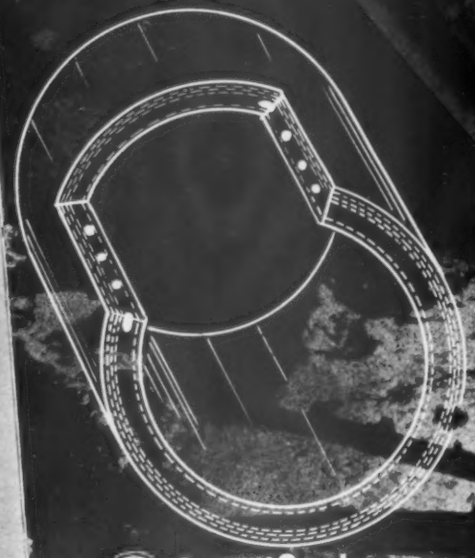
2,496,000 CUBIC YARDS!

SAND, clay, boulders, roots and phosphate rock — all are sucked up like soda through a straw by the 12" Goodyear Style M Suction Hose here photographed. In its three years' service in a southern phosphate pit it has handled 2,496,000 cubic yards of this highly abrasive sludge — *more than twice the yardage handled by any other make of suction hose used in this mine.* And it is still far from being worn out!

Job-fitted by the GTM

That is typical of the extra service you get from all Goodyear Mechanical Rubber Goods — sand and water suction hose, jetting hose, dredging sleeves; transmission, elevator and conveyor belting — because all are individually specified to their job by the G. T. M. — Goodyear Technical Man. This friendly expert listens to your problems; his on-the-ground analysis of your need enables Goodyear to employ its vast experience in compounding rubber to build you a "made-to-order" product. What that means in lower replacement and maintenance expense, in lower operating costs, is well indicated by the amazing record quoted above.

To bring the G. T. M. to your office, drop a line to Goodyear, Akron, Ohio, or Los Angeles, California — or the nearest Goodyear Mechanical Rubber Goods Distributor.

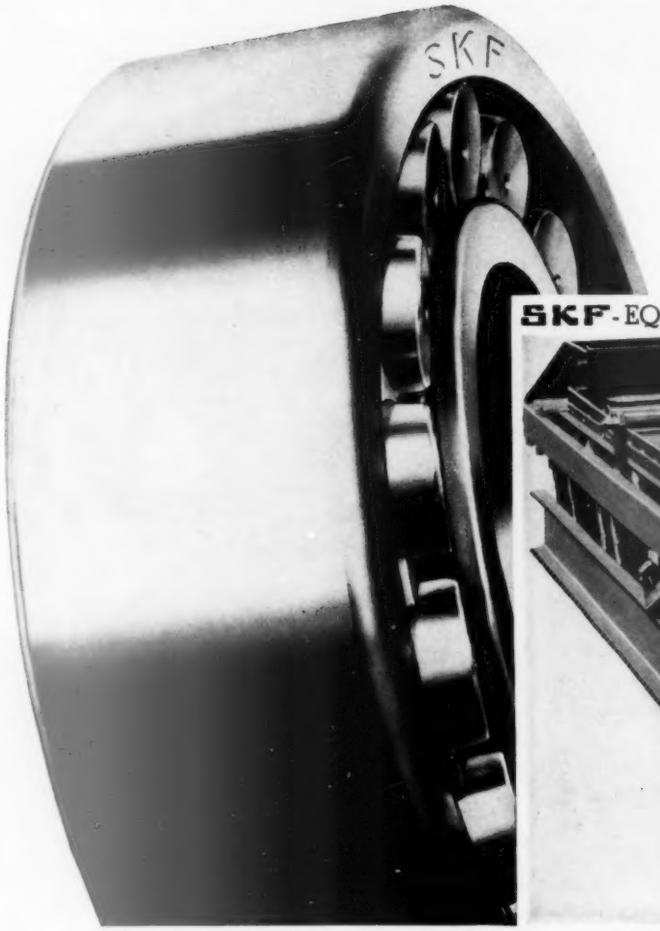


THERE'S A GOODYEAR BATTERY NOW!

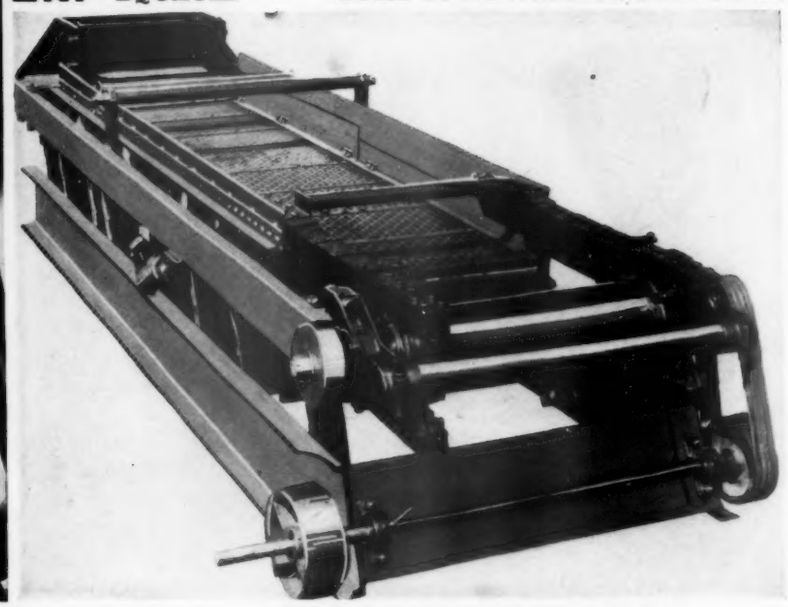
GTM Specified
GOODYEAR STYLE M SUCTION HOSE
for heavy duty, made in all sizes—length up to 50 feet

GOODYEAR

Belts · Molded Goods · Hose · Packing



SKF-EQUIPPED BUILT BY HOWARD-COOPER CORP.



MATERIAL MOVED QUICKLY

with **SKF**-*equipped vibratory screens*

Many a tough job goes to SKF Bearings because SKF can stand the gaff. Supporting the eccentric shafts on this Symons Vibratory Screen at speeds from 850 to 1000 r. p. m. is one of them. No matter how thick the dust in which this screen works . . . no matter how severe the shocks imposed upon them . . . four SKF Heavy Duty Self-Aligning Ball Bearings work smoothly, dependably, efficiently.

In the self-contained SKF Bearings on this screen, there's the extra strength for loads and overloads . . . built-in alignment that eliminates bearing binding . . . construction that requires no adjustment and only infrequent lubrication. In addition, they're kept clean by positively sealed housings. The tougher the job, the greater the need for SKF.

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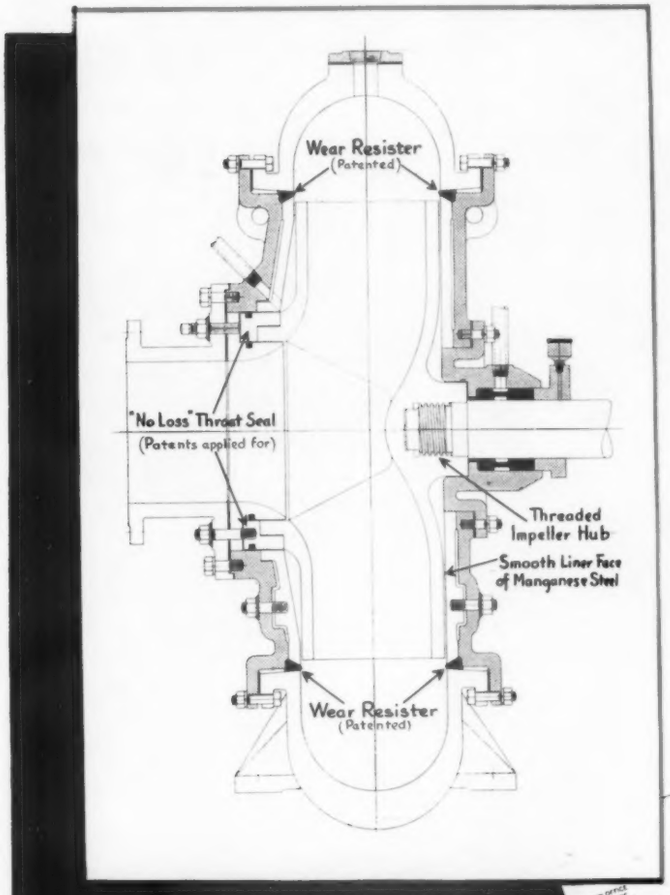
MORE THAN
1200
TYPES AND SIZES
Industry comes to SKF for unbiased bearing counsel because SKF makes practically all types of anti-friction bearings.

SKF

BALL AND ROLLER BEARINGS

THE COMPLETE DIAMOND DREDGE PUMP



Showing super-features of Diamond Dredge Pump construction. All Parts made of Diamond Manganese Steel.

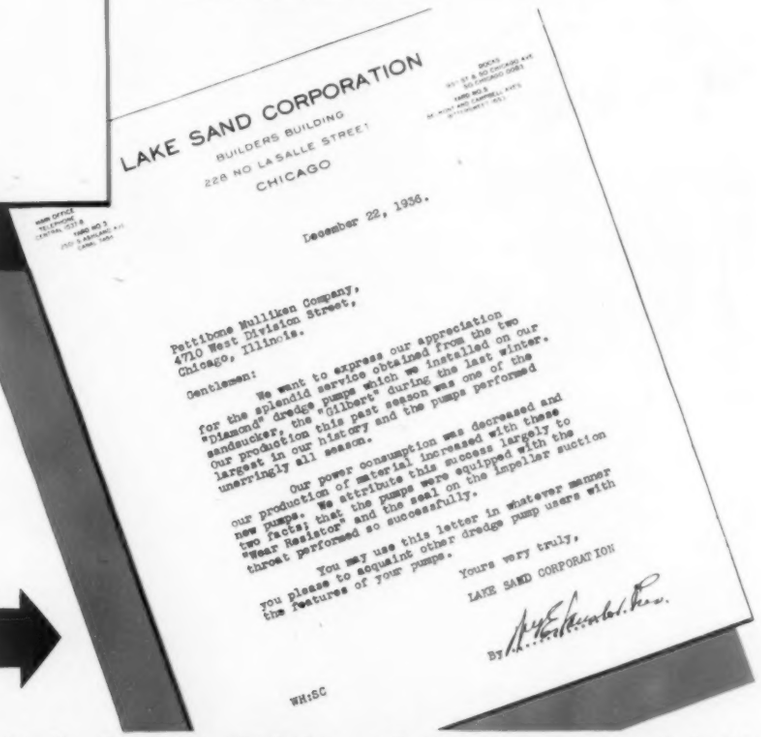
NOW comes a greater Diamond Dredge Pump with newly developed features and finely engineered construction for still better performance. For years, Diamond Dredge Pumps have been recognized for their ability to produce materials at low cost. Since 1932, P. M. Co. engineers have still further improved the design and perfected detail parts to reduce operating costs to a minimum. These new developments have been tried and proven in actual service.

Wear Resister—A patented, exclusive feature that protects pump shell, side plates and liners from wear at vital points.

Threaded Impeller Hub or Bore—This construction gives greater impeller throat clearance and insures a true running impeller at all times.

"No Loss" Throat Seal—This special construction prevents internal leakage with the aid of clean pressure water. Due to its efficiency only a minimum quantity of clean pressure water is required. Wear on side plate liners and impeller is greatly reduced. (Patents applied for.)

Be sure to investigate Diamond advanced features. They can be applied to your present dredge pump at low cost.



LAKE SAND CORPORATION
BUILDERS BUILDING
228 NO LA SALLE STREET
CHICAGO

December 22, 1936.

Pettibone Mulliken Company,
4710 West Division Street,
Chicago, Illinois.

Gentlemen:

We want to express our appreciation for the splendid service obtained from the two "Diamond" dredge pumps which we installed on our sandsucker, the "Gilbert" during the last winter. Our production this past season was one of the largest in our history and the pumps performed unerringly all season.

Our power consumption was decreased and our production of material increased with these new pumps. We attribute this success largely to two facts; that the pumps were equipped with the "Wear Resistor" and the seal on the impeller suction throat performed so successfully.

You may use this letter in whatever manner you please to acquaint other dredge pump users with the features of your pumps.

Yours very truly,
LAKE SAND CORPORATION
By

WH:SC

Read what this satisfied user has to say:

PETTIBONE MULLIKEN COMPANY

DEPENDABLE MANGANESE STEEL PRODUCTS

4710 WEST DIVISION STREET — CHICAGO, ILLINOIS

P. M. Co. Products include Traveling Chain Cutters, Rotary Cutters, Elbows, Flap valves, Nipples, Jaw Plates, Crusher Parts, Dippers, Dipper Teeth, Bucket Lips, Sheaves, and many other Manganese Steel Products.

AMERICAN TIGER BRAND IS USED TO *rough going*

AMERICAN TIGER BRAND WIRE ROPE

WHEREVER the going is tough —and the need for exceptional dependability exists — American Tiger Brand Wire Rope will establish remarkable records for its users.

This wire rope has proved its worth in keeping equipment in operation, in doing away with costly replacements and in lowering operating costs. Experience has proved its superiority. Always specify American Tiger Brand Wire Rope. Convenient stocks and our nearby engineers are both at your immediate call.

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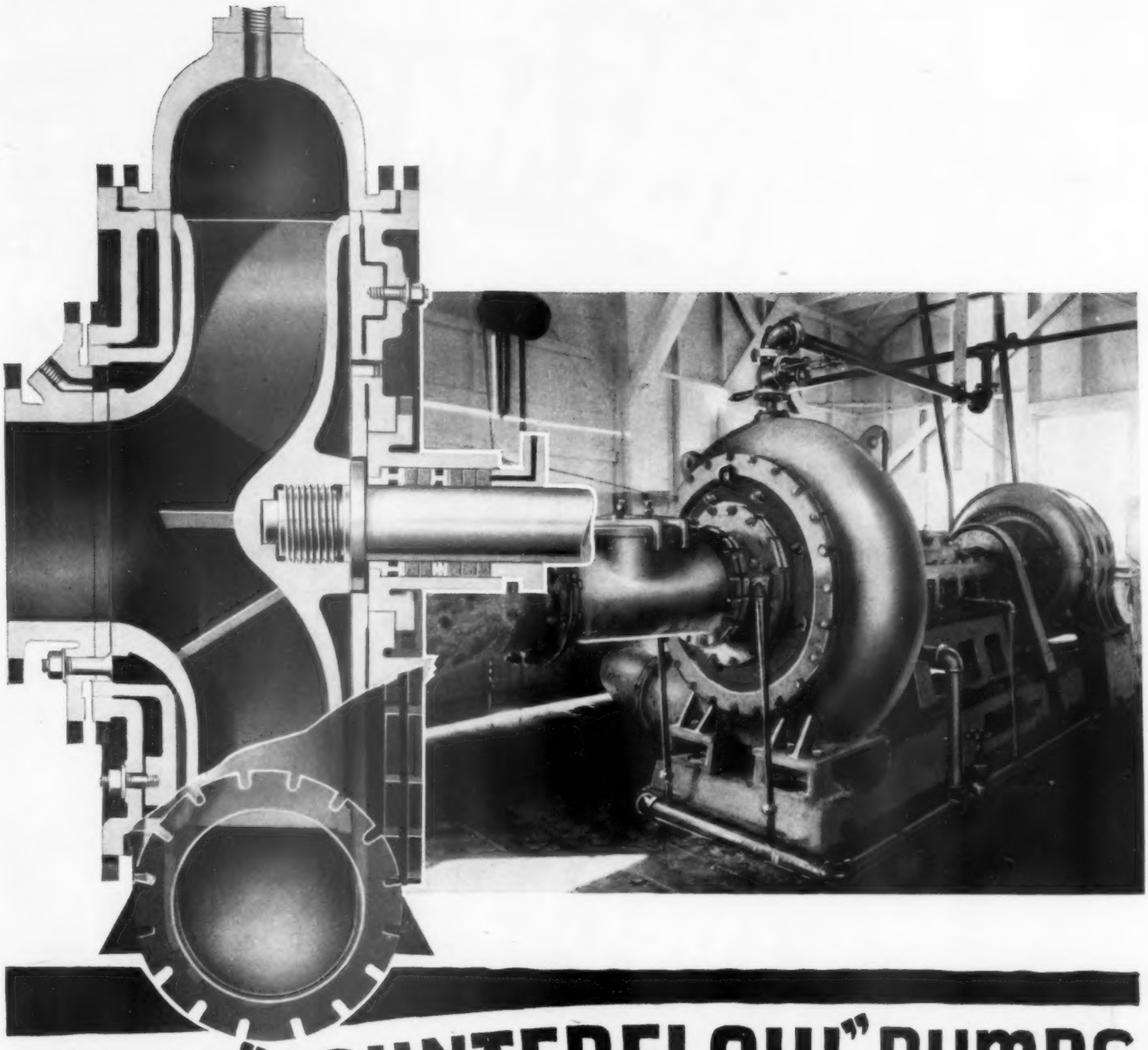
UNITED STATES STEEL



AMSCO "COUNTERFLOW" PUMPS

Long recognized as the leading maker of abrasive material handling pumps, AMSCO now offers a major design improvement in the "COUNTERFLOW" Pump. The result of years of experience, the "COUNTERFLOW" Pump combines several new design advantages with the correct application of manganese steel, "the toughest steel known."

The "COUNTERFLOW" Pump features: a wide funnel-mouth impeller; threading of the impeller bore; elimination of internal leakage; *and most important — greatly reduced internal wear* accomplished by providing clear water, under pressure between the impeller shrouds and the shell side plates. This AMSCO feature introduces clear water between the shrouds and plates with a "counter-flow" action, replacing sand-laden water which is a cutting compound, with clear water which is a lubricant — thus the name, the AMSCO "COUNTERFLOW" Pump.

This new design is not only available in all sizes and types of new AMSCO Pumps, but practically all pumps now in service may be converted at nominal cost to take advantage of "COUNTERFLOW" features.

Write for details on AMSCO "COUNTERFLOW" Pumps and how to increase the life of your old pumps by making "COUNTERFLOW" changes!

AMERICAN MANGANESE STEEL COMPANY

Division of American Brake Shoe & Foundry Company

396 East 14th Street, Chicago Heights, Ill.

Foundries at Chicago Heights, Ill.; New Castle, Del.; Denver, Colo.; Oakland, Calif.; Los Angeles, Calif. • Offices in Principal Cities

AMSCO

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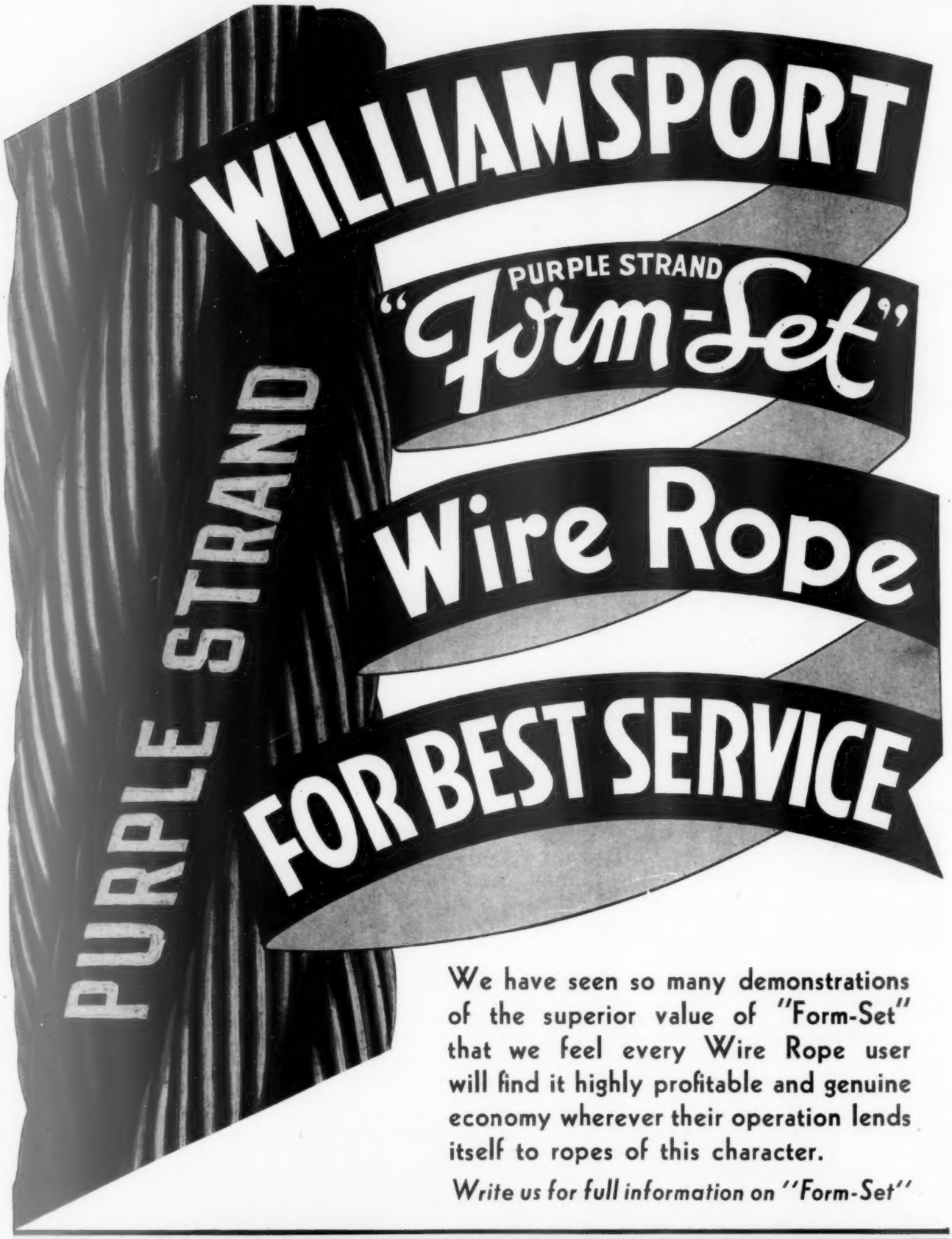

We have seen so many demonstrations of the superior value of "Form-Set" that we feel every Wire Rope user will find it highly profitable and genuine economy wherever their operation lends itself to ropes of this character.

Write us for full information on "Form-Set"

WILLIAMSPORT WIRE ROPE CO.

Williamsport, Pa. 122 So. Michigan Ave., Chicago, Ill.

Other Offices in All Principal Cities

SEALDROK

The modern waterproofing process that gives super-durability to cold-lay asphalt mixtures.

—It keys the coating securely to the stone.

—Locks out moisture and frost.

—Insures maximum penetration and impregnation of aggregate.

—Prevents uncoating and stops disintegration of bituminous paving.

WATERPROOF MINERAL AGGREGATE

Today's demand for better paving is fully answered by SEALDROK, a sensational new development that has proved its superiority in service and tests for the permanent waterproofing of mineral aggregate.

What It Is—Sealdrok is a special asphalt-base waterproofing compound entirely free of greasy liquifiers ordinarily used.

What It Does—It completely penetrates and impregnates the aggregate, positively sealing the finished paving from moisture and frost. It provides a greater bond between the asphalt cement coating and the aggregate, resulting in a more enduring pavement of uniform texture and surface.

Amazing Tests—The well known sodium sulfate test has been applied to Sealdrok-treated and on untreated aggregates. The photograph illustrates the results of 5-cycle tests conducted by Dr. Herbert F. Kriege, Ph.D. These figures tell the story:

	Size ¾" to 1¼"	Size ¾" to ⅜"
Treated	2.7% Disintegration	5.2%
Untreated	24.1% Disintegration	14.0%

Note the large amount of sluf-off from the untreated stone as contrasted with the almost negligible amount from Sealdrok-treated stone. This is the secret of the increased durability achieved by Sealdrok.

Opportunities for Profit—The great revival in road building opens up a broad demand for Sealdrok Waterproof Mineral Aggregate for the construction of stone and gravel secondary, farm-to-market roads, which are durable in service and economical in maintenance.

Easy Production—Sealdrok Waterproof Aggregate can be made economically in any existing plant—no new equipment is necessary.

SPECIFICATIONS furnished for Sealdrok Waterproofed Aggregate as follows:

(a) Stock piled for maintenance purposes; asphalt cement to be applied on the job.

(b) Aggregate treated with heavy compound for farm-to-market secondary roads.

(c) Cold-lay finished paving mixture to meet Class "H" and Class "I" bituminous pavements.

Write for Sealdrok specifications today.

AMERICAN SEALDROK, INC.

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Chicago, Ill.

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1015 Atlas Bldg.
Columbus, O.

STRIPPING 49 YARDS HOURLY

LeTourneau 8-Yard Carryall loading in 60 feet. Time, .9 minute

WITH A LE TOURNEAU Carryall

Manufacturers of: Angledozers,* Buggies,* Bulldozers, Carryall* Scrapers. Cranes, Drag Scrapers Power Control Units, Rooters,* Semi Trailers.

*Name registered U. S. Patent Office.

Pit operators near St. David, Illinois, to cut cost of stripping overburden last fall, put an 8-Yard LeTourneau Carryall Scraper and Caterpillar tractor to work excavating. In wet, heavy, well-packed clay, this outfit loaded in 50 to 60 feet, made complete cycles of load, haul and return on 1100-foot round trip in an average of 6.34 minutes. Hourly yardage on this haul was 49 cubic yards, brought stripping costs down to a new low.

This experience is typical—on many stripping jobs. LeTourneau Carryalls are cutting costs by moving dirt cheaper than is possible by any other method now available. A versatility born of correct, job proved design, stout construction and powerful, trigger-quick cable control makes possible the fast economical movement of big yardages by LeTourneau Carryalls.

Where an unusually large amount of stripping must be done, Carryalls used in tandem are amazingly efficient and economical. Ask your Caterpillar tractor dealer to show you what LeTourneau equipment can do for you.

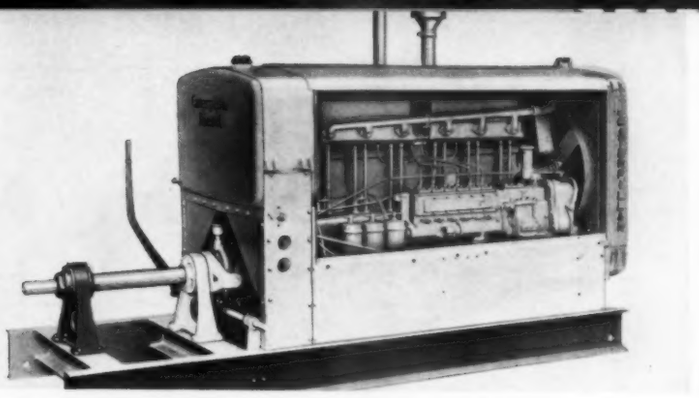
R. G. LE TOURNEAU, INC.

PEORIA, ILLINOIS — STOCKTON, CALIFORNIA

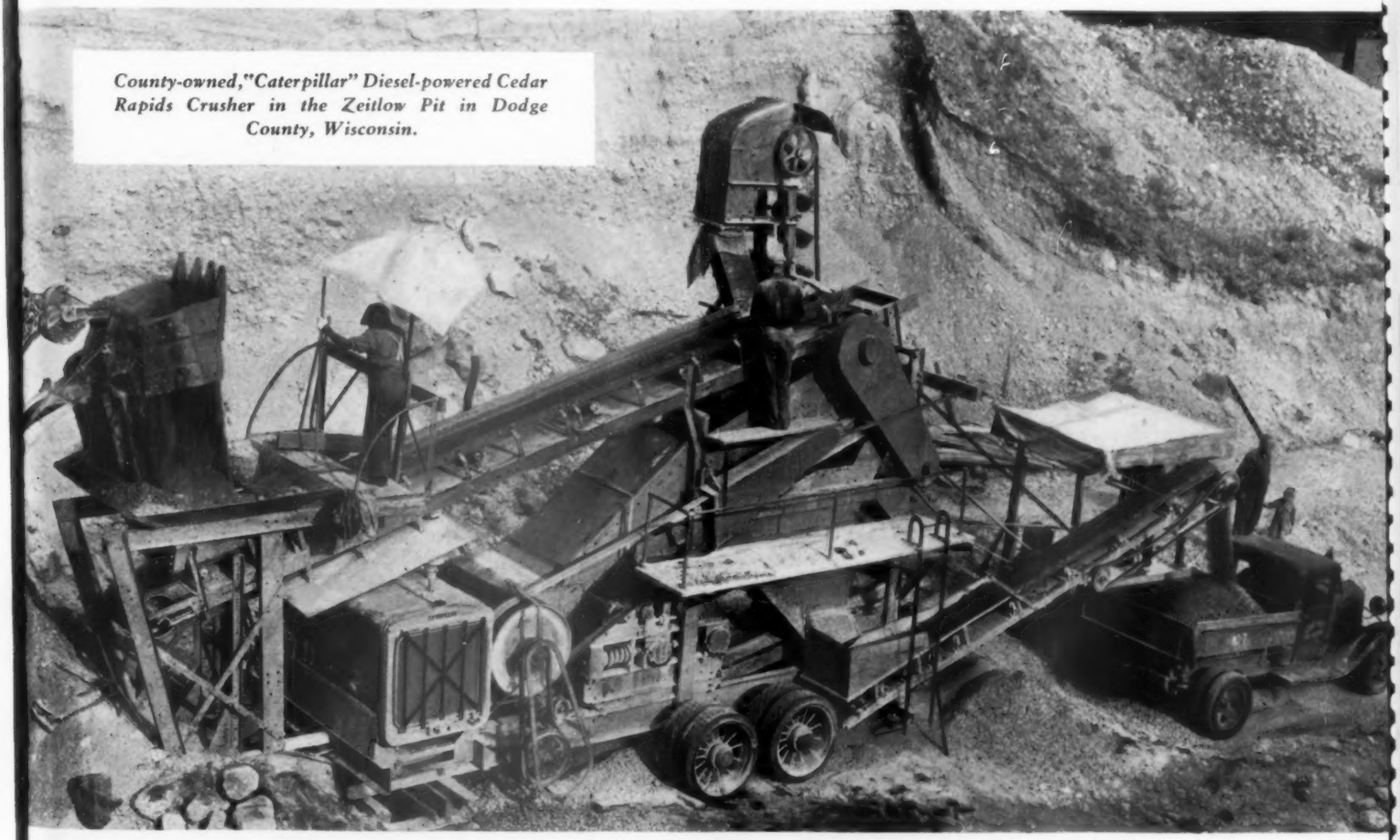
Cable Address: "Bobletorno"

LE TOURNEAU

Just a Few PENNIES *per hour for* POWER!



HERE'S a crushing plant whose job and capacity would seem to make power a costly factor. But with a "Caterpillar" Diesel Engine the operating cost is way below that of any other form of power. Five to seven hundred yards a day roll off the conveyor. Yet only four gallons of 7½c Diesel fuel are required for this output. Figure it out. Compare costs on your own power needs. . . . You'll find you can save a lot of money with "Caterpillar" Diesel power. Crusher, shovel, derrick, drag-line—they all show a better profit margin with "Caterpillar" Diesel Engine drive. *Get the facts.* . . . There's a "Caterpillar" dealer near you with factory-trained service men and stocks of machines and parts.



County-owned,"Caterpillar" Diesel-powered Cedar Rapids Crusher in the Zeitlow Pit in Dodge County, Wisconsin.

CATERPILLAR DIESEL ENGINES

REG. U. S. PAT. OFF.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

WORLD'S LARGEST MANUFACTURER OF DIESEL ENGINES

Which—The Go-Getter—or the Sales-Statesman?

By Ernest V. Madison

One of the colloquial terms of the day, widely used in salesology is the "Go-Getter."

A "Go-Getter" is defined in current slang as one who "brings home the bacon"; or specifically to we who buy, as one who calls, hypnotizes us with words and personality and leaves with our order. His purpose is to make the immediate sale and the largest possible profit from it.

While go-getting qualities are indicative of admirable energy, they are sometimes found in connection with merchandise hardly safest for us to buy. The salesman we should welcome is one who represents a house, managed by a Sales-Statesman.

A Sales-Statesman has a view that extends far beyond the one immediate sale, therefore plans not so much for a large profit from the single sale as for building into his business methods a quality and satisfaction which will form the foundation for future business.

A thought in this connection is that the steady, consistent advertiser is always a Sales-Statesman. He cannot be otherwise.

The purpose of his advertising is to aid in obtaining new customers from whom repeat orders will be received. He depends on the accumulative profits from these repeat orders to repay the cost of his advertising and his eventual net profits.

It is plain, then, that any advertising campaign to be successful, permanently, must be built on the satisfaction given by the product advertised, by honest business methods and by a considerate service to the buyer.

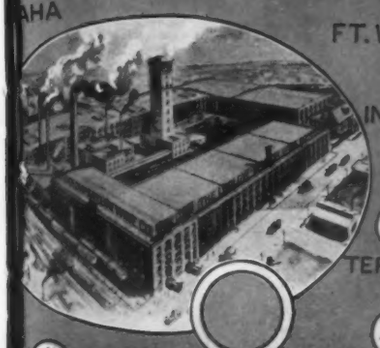
The advertisements in this issue of **PIT AND QUARRY** are the messages of Sales Statesmen. The products are good products.

In buying from the advertising columns of this paper, there is safety—and value-fold.

WIRE CLOTH *for* EVERY INDUSTRY

Nearest to Your Needs · · Quickest Shipment · · Fewest Days in Transit

SCREEN USERS of all America depend upon St. Louis for complete, reliable, economical and quickly accessible Wire Cloth Service. · · · Tremendous Ludlow-Saylor Stocks supply a thousand weights and weaves of woven screens, in standard widths. Ordinary specifications are shipped the same day order is received. Modern looms make any special screen in the promptest, best and least expensive way.



The St. Louis System of Package-Car Deliveries

brings us within quick reach of all the World. Twenty-eight great Railway systems co-operate with St. Louis shippers, to give expedited freight service to all important ports and distribution points . . . 1200 sealed cars daily, on rigidly maintained schedules, at regular freight rates, no extras.

IF THE NEW STA-TRU SCREEN DESCRIPTION WON'T FETCH IT SEND A SKETCH

The LUDLOW-SAYLOR WIRE COMPANY SAINT LOUIS

610 S. NEWSTEAD AVE.

LUDLOW-SAYLOR WIRE CO.
610 S. Newstead Ave.
St. Louis, Mo.

Please send catalogue No. 48-E

.....

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LUDLOW-SAYLOR WIRE CO.
610 S. Newstead Ave.
St. Louis, Mo.

Please send us Book No. 48-E "Getting Results."

.....

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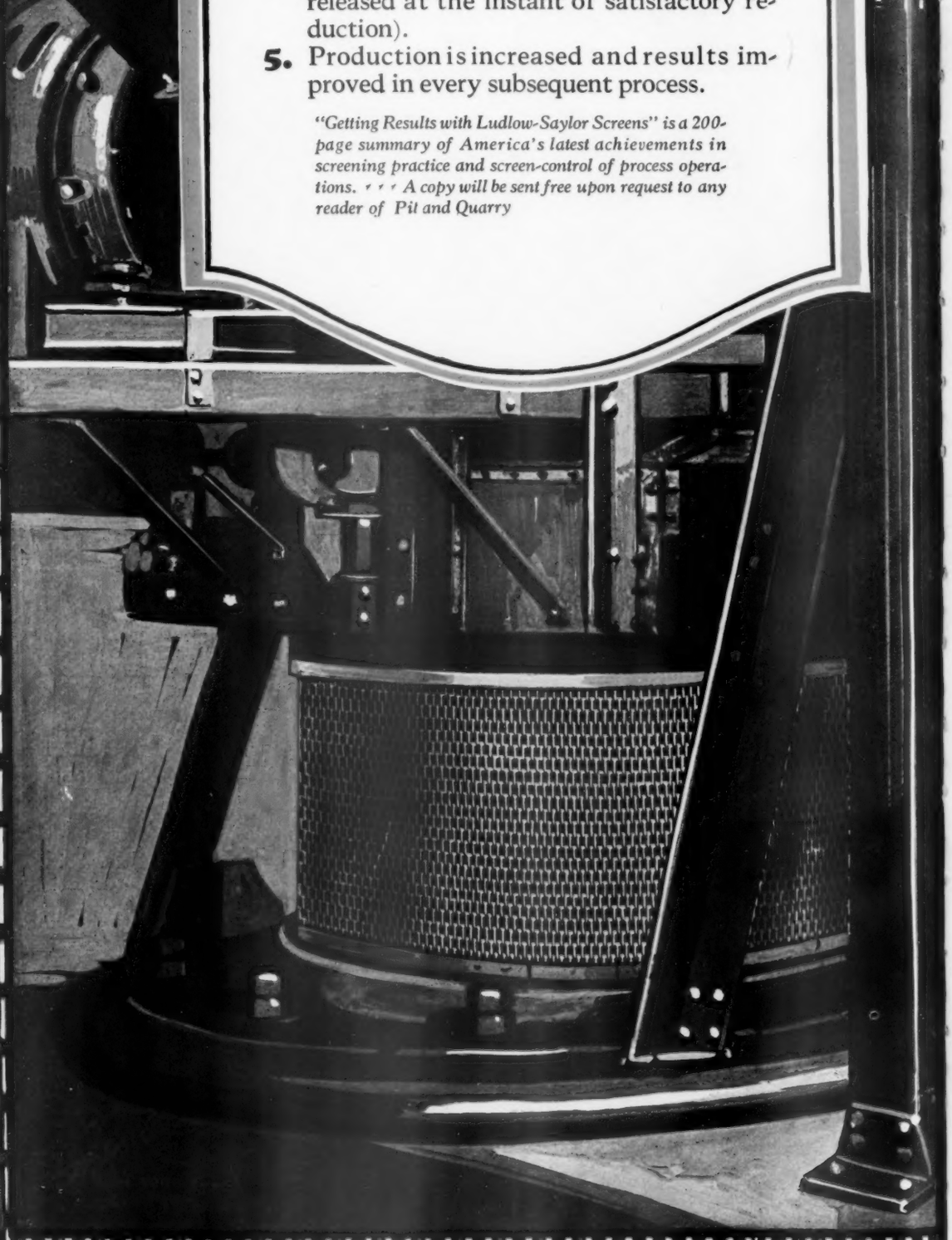
Positive Screen Control of Pulverizer Product *Effects 5 Savings*

1. Tramp oversizes in product are *eliminated.*
2. Selective Grinding is controlled.
3. Power wastes from over-grinding are reduced.
4. Time in Process is decreased (desired sizes released at the instant of satisfactory reduction).
5. Production is increased and results improved in every subsequent process.

"Getting Results with Ludlow-Saylor Screens" is a 200-page summary of America's latest achievements in screening practice and screen-control of process operations. • • • A copy will be sent free upon request to any reader of Pit and Quarry

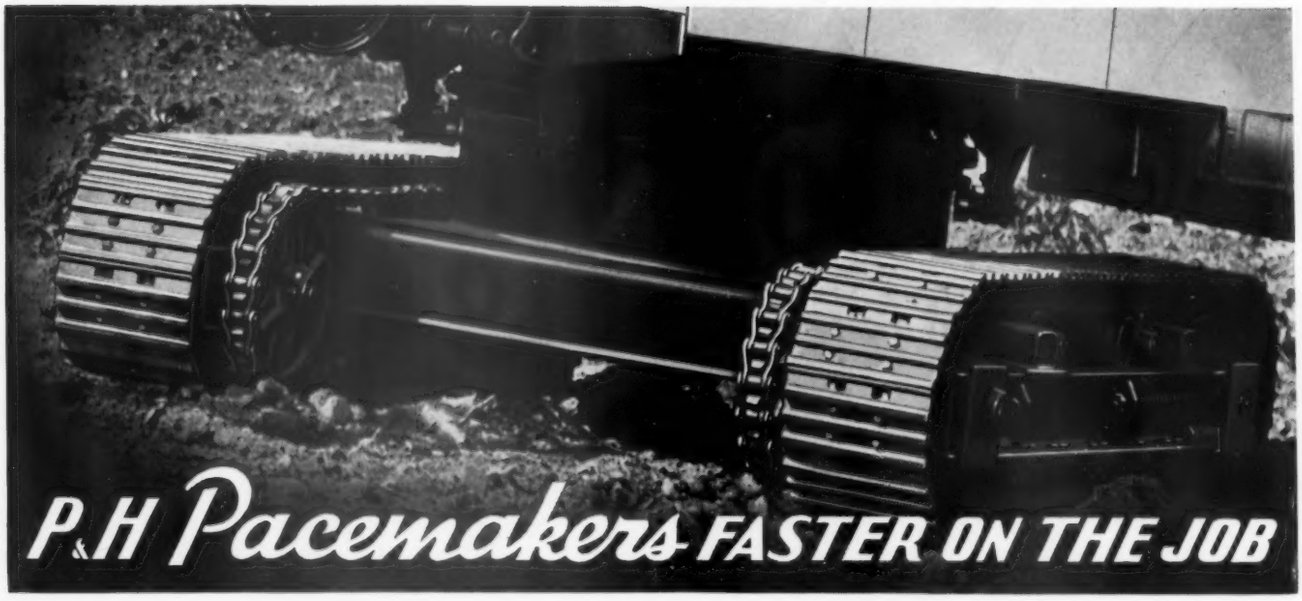


The LUDLOW-SAYLOR WIRE COMPANY ST. LOUIS
610 S. NEWSTEAD AVE.

"The whole industry will have to come to all welded construction to keep up with these P&H Pacemakers." — Frank Pakiz, shovel operator.

There's Millions

OF PROVED TRAVEL MILES BEHIND THESE TRACTOR TYPE CRAWLERS



The P&H Pacemakers are the first and only machines equipped with these tractor type crawlers. Here's an assembly that's *built* for travel—*hard travel*—not mere browsing. Hinge action shoes of tough heat-treated alloy steels take it over the ground with true rolling movement—with freedom from breakdowns wherever you go. This type of crawler has proved itself in literally millions of miles of tractor service . . . it's only one of the many important advancements that make these P&H Pacemakers faster on the job.

HARNISCHFEGER CORPORATION

4451 W. National Ave. *Established 1884* Milwaukee, Wis.

Warehouses and Service Stations:

Hoboken — Memphis — Jacksonville — Dallas — Seattle — Los Angeles — San Francisco

HARNISCHFEGER

CORPORATION

EXCAVATORS * ELECTRIC CRANES HOISTS * MOTORS * ARC WELDERS

Fuller for Conveying and

FOR many years the Fuller Company has held undisputed leadership in the field of feeding and conveying pulverized and finely divided materials through pipe lines. This leadership is clearly indicated by the large number of installations in successful operation made during the past decade, both in this country and abroad.

The illustration directly above shows the latest development of the Company . . . the Fuller-Kinyon Automatic Remote-Control Unloader. This machine is employed for unloading and conveying Portland cement, and other dry pulverized materials, and differs considerably from those previously manufactured by this Company. It offers a wider field of utility, greater handling capacity, the convenience, flexibility and safety of operation by remote control, simplified mechanical construction, and decreased liability to accidental stoppage.

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS · · · · ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS · · · AUTOMATIC BATCH WEIGHERS · · · BIN SIGNALS

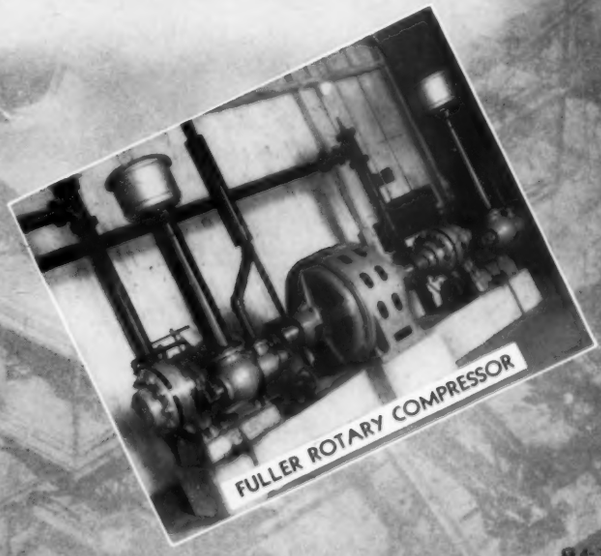
Feeding Pulverized and Granular Materials

Fuller-Kinyon Pump (Stationary)—for conveying pulverized materials. Capacities one to 300 tons an hour. Conveys cement as far as 3600 ft. and to elevations of 300 feet.

Fuller Rotary Feeder—Delivers raw materials, pulverized coal, cement, lime, etc., with consistent, volumetric accuracy. Eliminates flooding. Available in sizes to meet all normal plant requirements.

The Airveyor—A pneumatic conveyor for fine, crushed, and granular materials. A system that has many advantages.

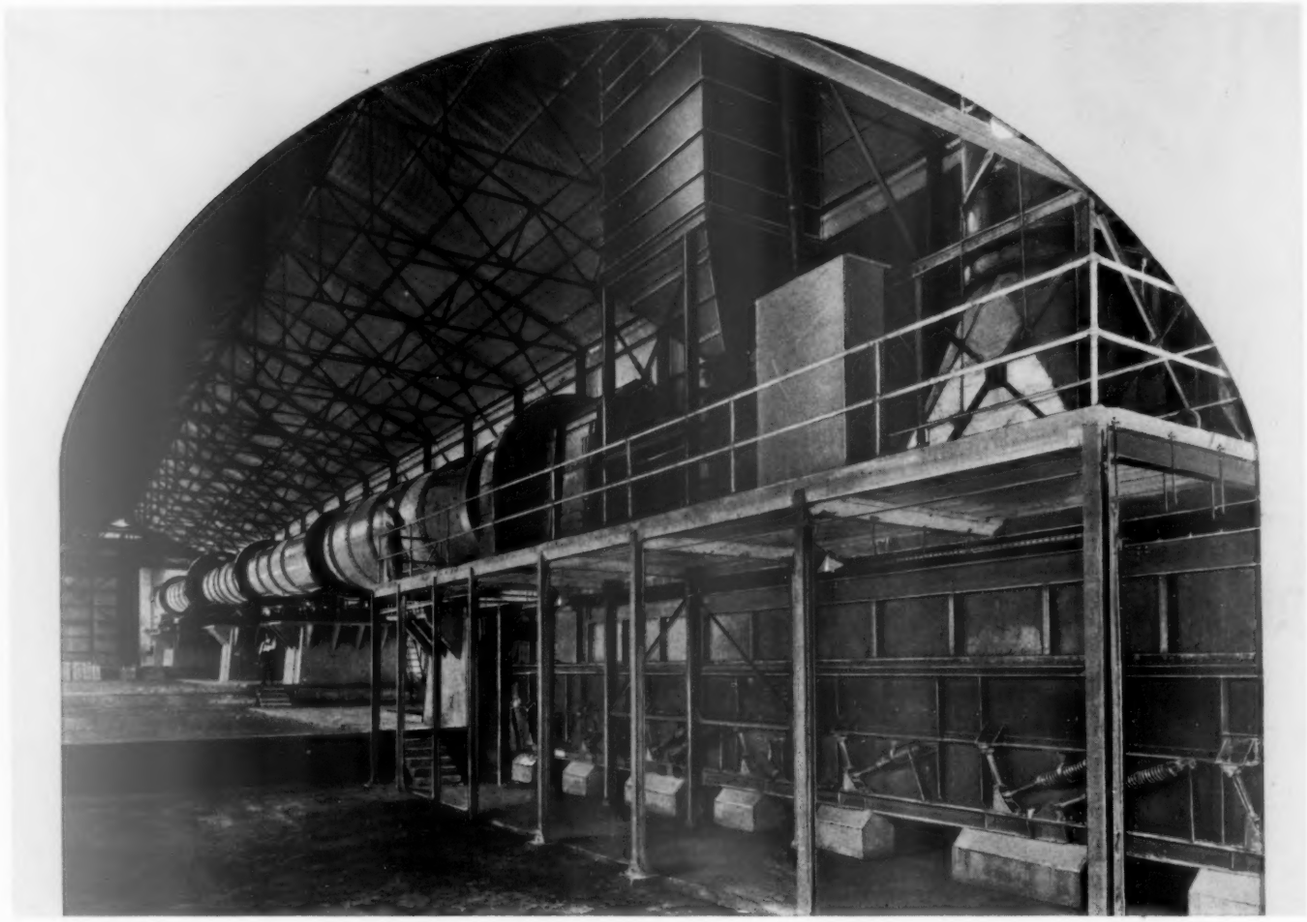
Fuller Rotary Compressors and Vacuum Pumps—Built in Single and Two-Stage types. Available in a full range of capacities up to 1800-c.f.m. at standard motor speeds; pressures up to 125 lb. gage . . . Vacuums up to 99 per cent of barometer.



G4-T

FULLER COMPANY - CATASAUQUA, PA.

CHICAGO—1118 Marquette Bldg. SAN FRANCISCO—320-321 Chancery Bldg.



MODERN

IMPROVED EQUIPMENT POINTS THE WAY TO CEMENT PLANT PROFITS

PLANT rehabilitation to obtain improved quality of product, and to reduce operating costs is "the way to profits" for many plants.

There are many cement plants in which substantial economies in grinding, kiln operation and clinker cooling are possible. Kilns with enlarged calcining zones result in fuel saving and a more uniform product. Air quenching clinker coolers, designed for rapid transfer of heat to cooling air, and the utilization of the recuperated heat, not only save money for fuel but also reduce grinding costs and produce better cement. Progressive grinding Compeb mills result in low power consumption, and permit a wide range of fineness control including the requirements of high early strength cement.

Modern kilns, coolers, and Compeb mills with Concavex grinding media, together with modern crushers, vibrating screens, centrifugal pumps and special motors . . . all contribute toward the production of better cement at lower cost.

A-C ENGINEERED

Blowers, Compressors, Vacuum Pumps.
Cement Making Machinery, Rock Crushers, Screens, Roadbuilding Equipment.
Centrifugal Pumps.
Electric Generators, Transformers, Converters, Rectifiers, Switchgear and Regulators.
Electric Motors for all purposes.
Farm Machinery, Road Machinery, Farm and Industrial Tractors.

EQUIPMENT ENGINEERS TO INDUSTRY

ALLIS-CHALMERS

MILWAUKEE WISCONSIN

A-C ENGINEERED

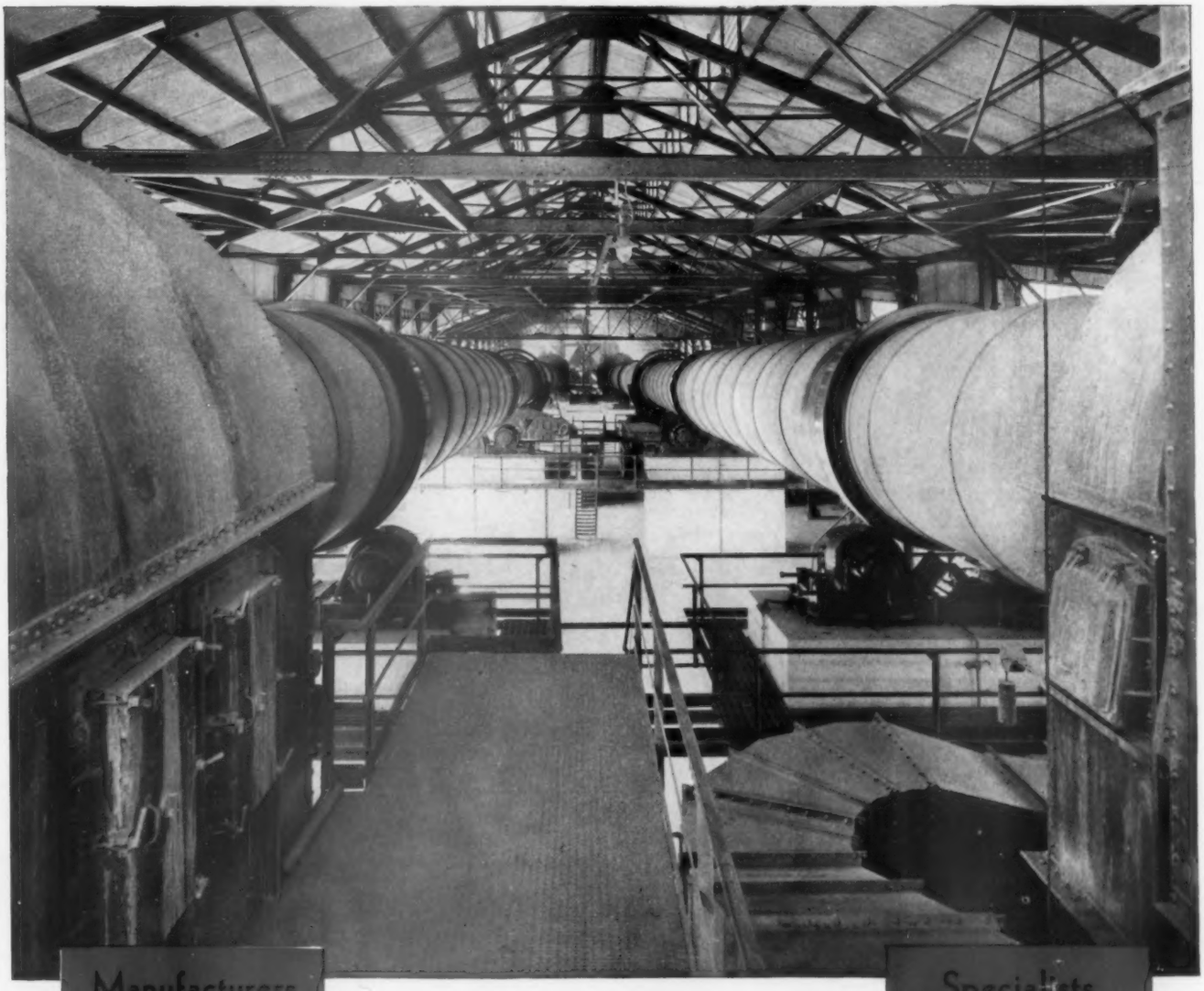
Flour, Feed and Flaking Mill Machinery.
Hydraulic Turbines and Accessories.
Mining, Metallurgical and Hoisting Equipment.
Sawmill and Timber Preserving Machinery.
Steam Turbines, Steam Engines and Condensers.
Texrope Drives.
Water Wheels and Accessories.

Bulletins for various types of equipment furnished on request. Address Allis-Chalmers Mfg. Company, Milwaukee, Wisconsin

MODERNIZE TO ECONOMIZE

Lower the cost of Production
Improve the Quality of Product
by Utilizing Modern

CEMENT MAKING MACHINERY
CEMENT PLANT ENGINEERING



Manufacturers of a complete Line of Modern CEMENT MAKING MACHINERY

F. L. SMIDTH & CO.
225 BROADWAY, NEW YORK

Specialists in Engineering of Modern CEMENT MAKING FACTORIES

Three Williams "All-Star" Performers for .1937.

ROLLER MILLS with AIR SEPARATION

The outstanding equipment for all fine grinding operations. The following are some advantages of Williams Roller Mills with Air Separation:
A more efficient Air Separator. Instantly changeable from 70% 100-mesh to 99.99% 325-mesh. Heavy boiler plate top. A more durable Roller Mill. Ball Bearing operation throughout. Steel instead of cast iron at important points. Dries and grinds simultaneously.

HAMMER CRUSHERS

Over 50 sizes and types of Williams Hammer Crushers are available. Small sizes crush one-man stone or screen rejects to agricultural size, ¾", 1¼" or 2½" in one operation. Larger sizes take stone from largest primary crushers or steam shovel loaded rock and reduce to commercial sizes in one reduction. Usually one Williams Crusher supplants two or three machines of smaller crushing ratio.

VIBRATING SCREENS

Many users of Williams Roller Mills and Hammer Mills have found our Vibrating Screens very efficient and economical in their plants. Construction is entirely of steel plate, steel castings and structural shapes substantially riveted together and then electrically welded, thereby positively preventing its shaking apart. Built in single, double and triple deck types exposed screen or totally enclosed for handling dusty products.

If you have a reduction problem either coarse grinding, fine grinding or a complete plant, let Williams engineers tell you about the proper equipment for the job.

Williams Patent Crusher & Pulverizer Co.
802 St. Louis Ave., St. Louis, Mo.

SALES AGENCIES IN ALL PRINCIPAL CITIES INCLUDING

CHICAGO	NEW YORK	SAN FRANCISCO
37 West Van Buren St.	15 Park Row	326 Rialto Bldg.

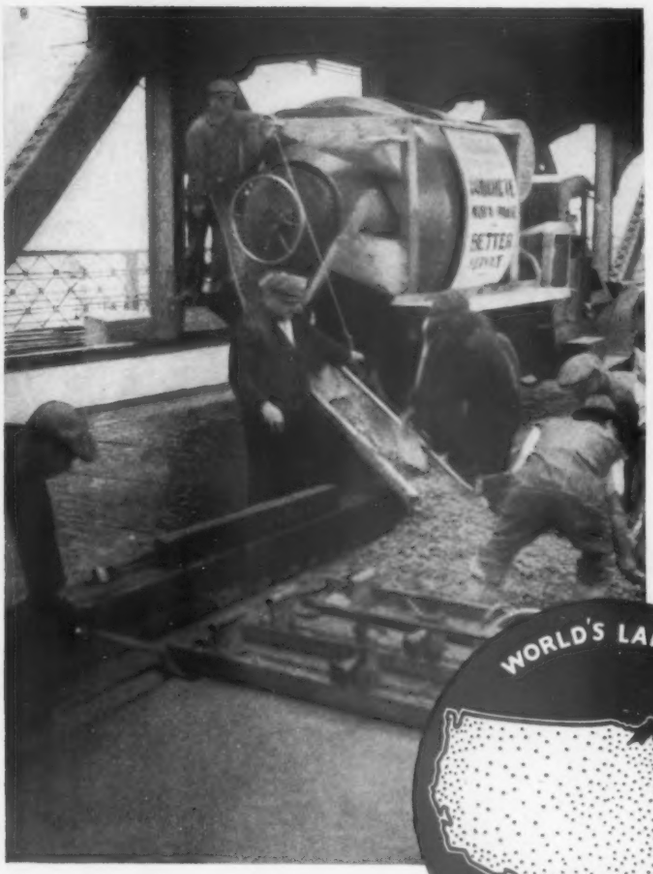
WILLIAMS PATENT CRUSHER & PULVERIZER CO. ST. LOUIS, MO. U.S.A. TRADE MARK
REG U.S. PAT OFF

Williams

OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD

Williams

PATENT CRUSHERS GRINDERS SHREDDERS



Job Engineers Specify Concrete Mixed with JAEGERS!

• *In* CINCINNATI

There's a reason why engineers in Cincinnati, and from coast to coast, prefer concrete mixed with Jaeger Truck Mixers:

Jaeger's 100% accurate water control—exclusive Dual-Mix action with the Jaeger double-end-cone drum — Dual-Mixing speeds to compensate for long or short hauls—fast, 2-speed discharge with complete absence of segregation and complete self-cleaning—these features mean concrete of recognized superior quality, workability and higher ultimate strength.

Users will also tell you that Jaeger's light weight and long life, because of highly developed design and the use of Man-Ten Alloy Steel, cut repair bills on mixers and trucks—save on tires—save on gas—help bring operators the maximum profit that comes from low cost operation.

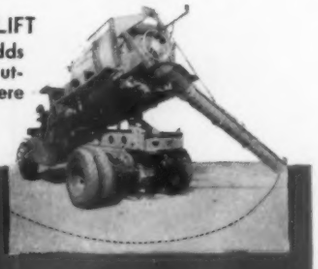
Because these features assure dependable, economical delivery of the finest concrete, more ready-mixed concrete is being delivered with Jaeger Truck Mixers than by any other method. In towns under 10,000 up to largest cities, Jaeger equipped plants are building bigger business and earning prosperity incomes for their owners. Write for catalog and information that will help you plan for a bigger share of this fast-growing market.

Pioneer Truck-Mixer User Tells of JAEGER Experience . . .

"Writer was original transit mix operator in Cincinnati metropolitan area. Since 1929 have bought 30 Jaeger mixers. Original 15 units, bought in 1929-30, poured over 300,000 cu. yds. of concrete in 3½ year period and are still in first class condition, good for indefinite service. To take care of peak pours have rented other makes of transit mixers. Several times engineers in charge asked us to put the rented equipment on other work as they preferred concrete produced by our Jaegers. Jaeger service on repair parts necessary on any mechanically operated unit is prompt. Very pleased to have you use my name as a satisfied user." The Howard Concrete Producing Company, Cincinnati, O.

THE JAEGER MACHINE CO.
602 DUBLIN AVE., COLUMBUS, OHIO

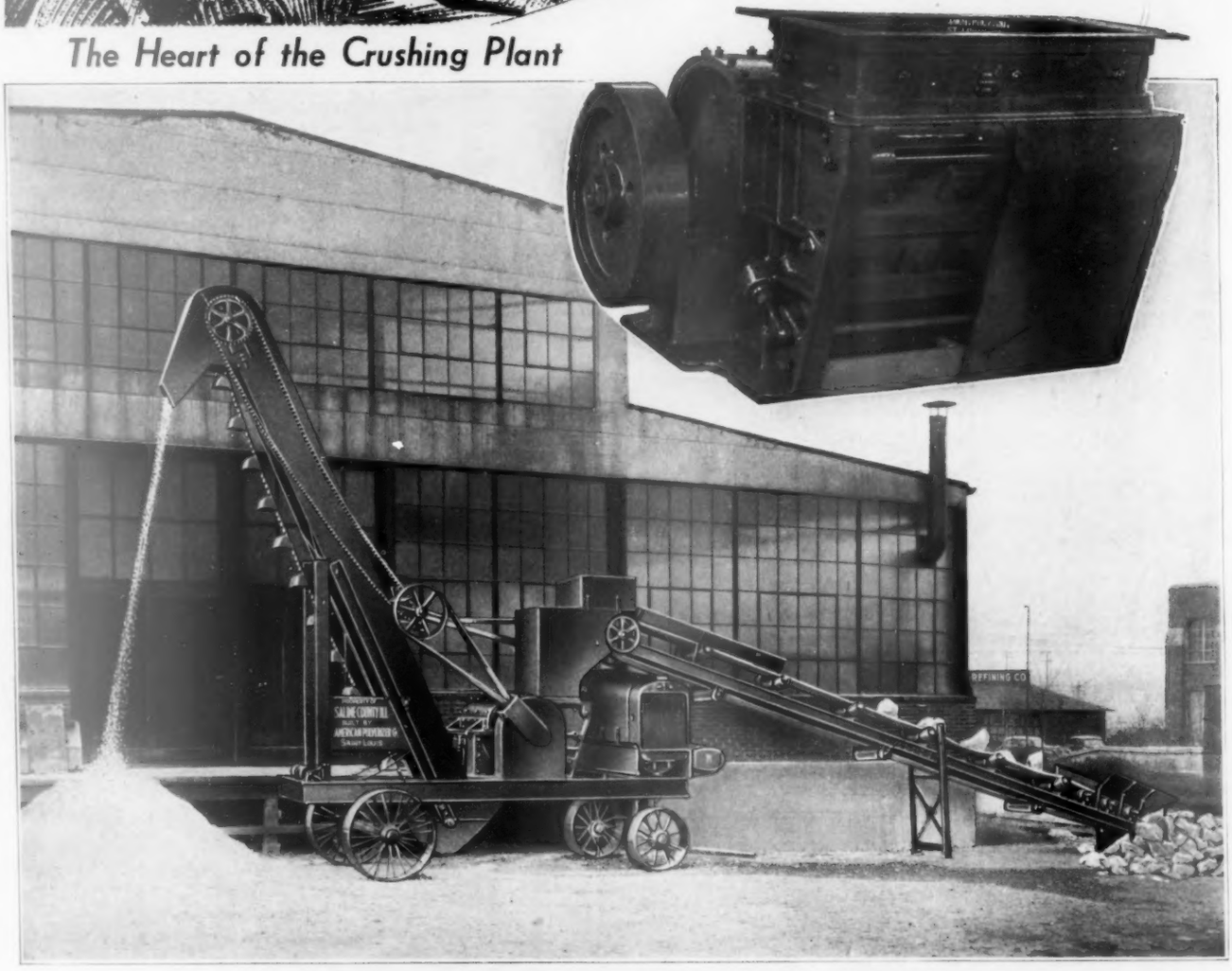
HIGH REAR LIFT
Attachment adds 75% more spouting area where needed.



JAEGER TRUCK MIXERS
SIZES: 1—1¼—2—3—4—5 CUBIC YARDS

"We insist upon American Crushers to get the most out of our portable plants"

The Heart of the Crushing Plant

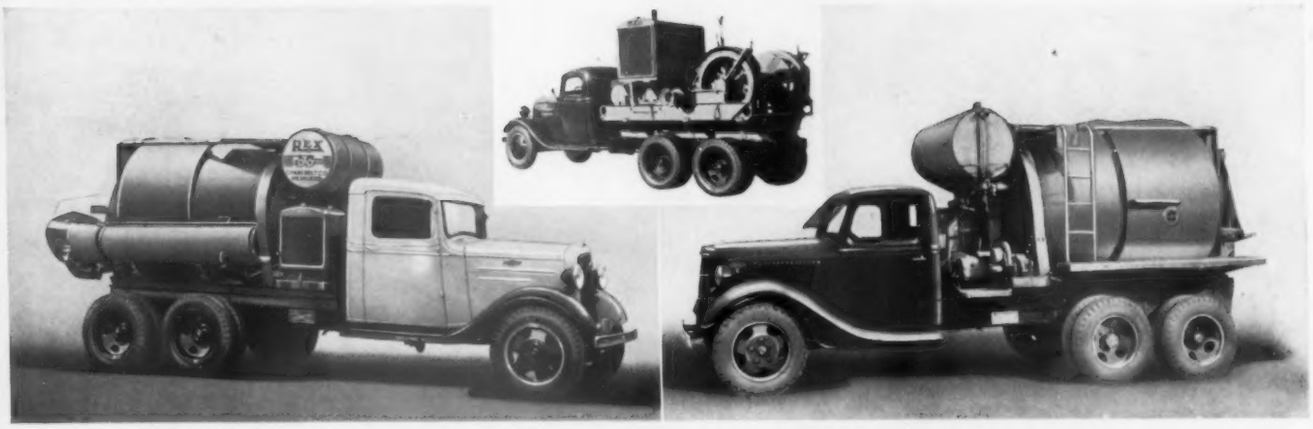


American Portable Crushing Plant in action

Typical unit reducing "man size" stone to ¾" aggregate product in one reduction at rate of 300 tons per day.

It's the Crusher that **makes the plant.** That is why American Portable Units can be depended upon for production of good quality materials, extra big tonnages, and trouble-free operation. In low first cost, cheaper installation, and minimum maintenance, American Hammermill Crushers take front rank throughout the industry. Write for details and specifications—remember that you can do a crushing job cheaper, faster and better the "American way."

AMERICAN PULVERIZER COMPANY
1289 Macklind Ave. St. Louis, Mo.



CONCRETE–CRUSHED STONE–GRAVEL

handled at lowest cost per yard-mile with THORNTON DRIVE

Speed up your operations this modern way, and save on investment, maintenance and operating expense. Find out how Thornton Four Rear Wheel Drive trucks run rings around the heavy, high-priced fellows; how they do time-saving and cost-saving stunts never dreamed of with old-fashioned, clumsy ton-of-truck to ton-of-load equipment. See how *others* are mounting heavy ready-mix equipment on the Thornton's back for swift load delivery under extreme traction conditions. Watch the Thornton hustle out of a pit with those *extra* yards of load, then go high-balling down the highway in high. At last *speed* has been put to work without *any* sacrifice of dependability!

Verify these strong statements—investigate this new thing—consider it carefully. Our engineering staff is at your service. May we hear from you?

The Thornton Four Rear Wheel Drive makes a heavy-duty truck out of a standard one-and-one-half ton truck, with gross capacity of 26,000 lbs., (wheelbase 142″ to 207″, each wheelbase correctly engineered to give proper load distribution) accommodating body sizes varying from eight to twenty feet. Thornton dual ratio gears, located between the two rear driving axles, multiply the power without straining the truck transmission line; rocker action springs reduce road impact, and added heavy channels reinforce the frame to 40″ under the cab. Thornton equipment may be purchased from the truck dealer, and may be financed through the same channel as the chassis.

U. S. Patents
1897153
2047088

Canadian Patents
356472
357064

TYPICAL OPERATIONS

(LEFT) Thornton — Chevrolet truck with Rex Moto-Mixer. Capacity 2-2½ yds. In service 18 months—operating cost cut down ⅓.

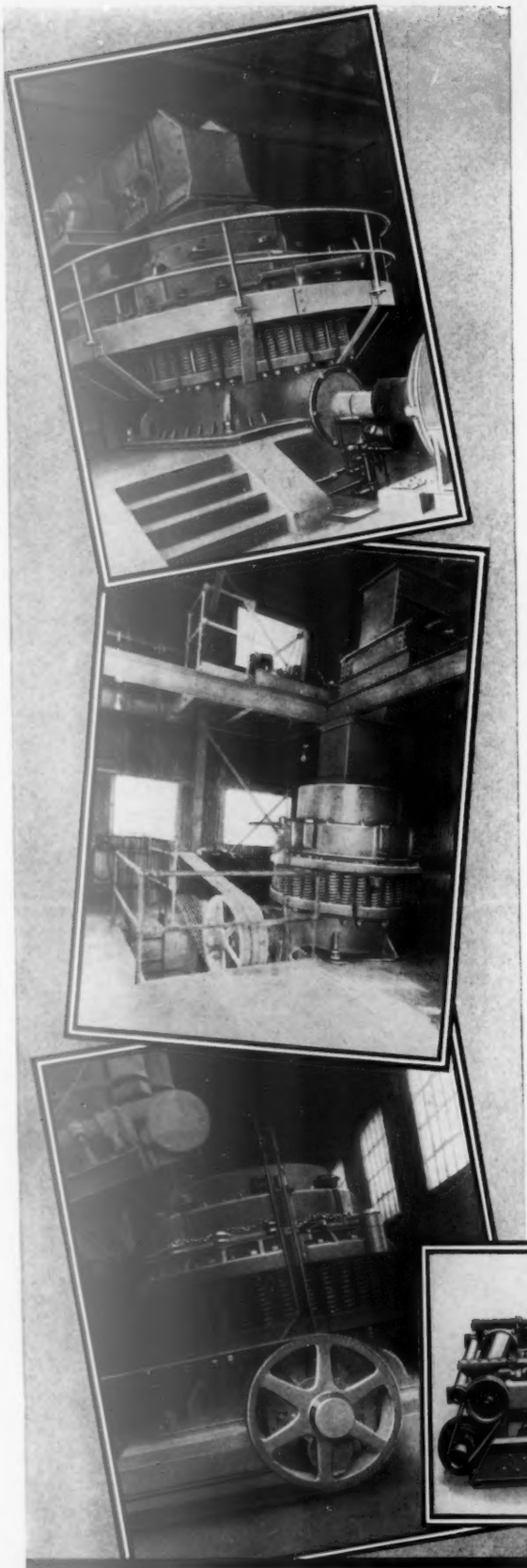
(CENTER) Thornton — Chevrolet truck with Cardwell All-Steel Hoist in use in Venezuela. Four rear wheel drive gives necessary traction.

(RIGHT) Thornton—Ford truck with Jaeger Truck Mixer. Capacity 3-3½ yds. Gross vehicle wt. 28,000 pounds. Replaced chassis costing double.

(BOTTOM) This Thornton—Ford, carrying 7½ yards, made 15 more trips per day than heavy trucks costing twice as much.

FOUR REAR WHEEL DRIVE

THORNTON TANDEM COMPANY
DETROIT, MICHIGAN, U. S. A.



Now is the time to get ready for next season's production

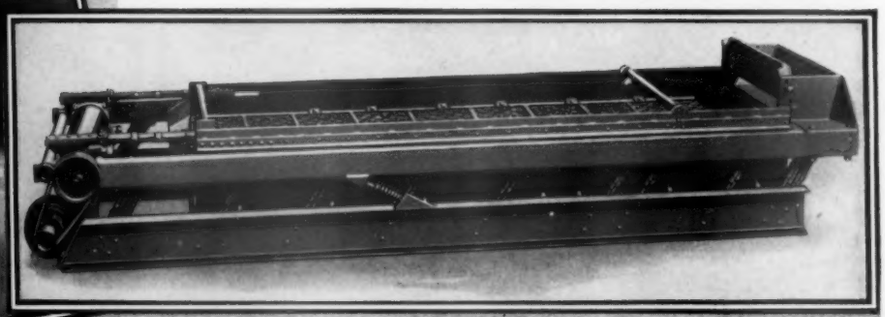
All indications point to an increased demand for materials required for road building and the construction field. Obsolete equipment cannot be expected to produce these materials profitably, nor of the better quality as is required today.

Nordberg offers two machines essential to any modernization program; Symons Cone Crushers and Screens. Wherever finely crushed materials are produced in quantity, the Cone Crusher stands without an equal. The flat Symons Screen with its unusual screening action and its close sizing, meets the most rigid material specifications. When getting your plant in shape for next season's run, investigate the merits of what Nordberg has to offer.

NORDBERG MANUFACTURING COMPANY

MILWAUKEE, WISCONSIN

New York City	London	Los Angeles
60 East 42nd St.	Bush House	Subway Term. Bldg.



CRUSHERS - SCREENS

BUILT TO GIVE *More Swings per Hour..*

Note upward curve of boom and high location of the shipper shaft, permitting unusual dumping heights without sacrifice of operating stability.

..MOVE MORE YARDS PER DAY

As compact and nimble as a sub-chaser—as rugged and powerful as a dreadnaught—the half-yard Badger was designed with a single object in view . . . *faster output.*

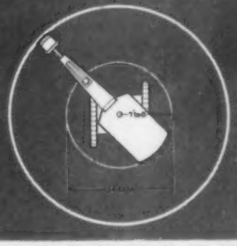
There is no swinging counter-weight to slow down the starting and stopping operations. No cab to limit visibility of operator. Low center of gravity holds the Badger steady. Boom dipper and dipper stick of light alloy steel, internal expanding clutch drums with extra wearing surface, and 41 anti-friction bearings combine to hold down operating and maintenance cost. *The net result is a faster starting, faster swinging, faster stopping, faster digging unit* that cuts digging time and costs amazingly.

Get the full story of the Badger's outperforming characteristics . . . Its unusual stability . . . Its extra dumping height and reach . . . Its speedy portability to new jobs at truck speeds . . . Its convertibility for crane, drag line, trench hoe, or pile driver. Mail coupon.

Saves Time IN TIGHT PLACES

When opening a cut or widening a narrow road, the Badger may be run close against the bank. Only an 8-foot roadbed is required. An additional 8 feet for loading of trucks makes the total width 16 feet.

With a full revolving half-yard shovel 7 to 8 feet of clearance ON ALL SIDES is essential to allow for tail swing . . . a total of 14 to 16 feet. Trucks spotted beside the shovel require an additional 8 feet.



THE AUSTIN-WESTERN ROAD MACHINERY CO.
AURORA, ILLINOIS

Austin-Western

The Austin-Western Road Machinery Co., A-7, Aurora, Illinois

☐ Send a salesman
Tell me more about the

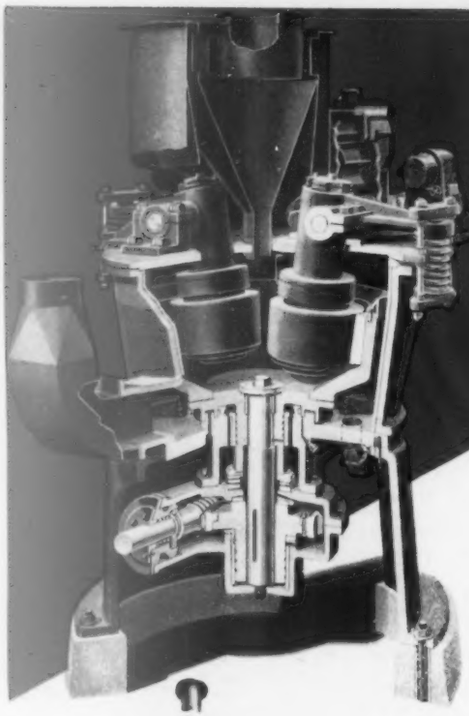
- ☐ Badger Shovel
- ☐ Motor Grader
- ☐ Roll-A-Plane
- ☐ Blade Grader
- ☐ Motor Sweeper
- ☐ Crushing & Washing Plants
- ☐ Elevating Graders
- ☐ 5-Yd. Scraper
- ☐ 12-Yd. Scraper
- ☐ Trail Cars
- ☐ Shovels and Cranes
- ☐ Bituminous Distributors
- ☐ Snow Plows

SH-705

Name .....

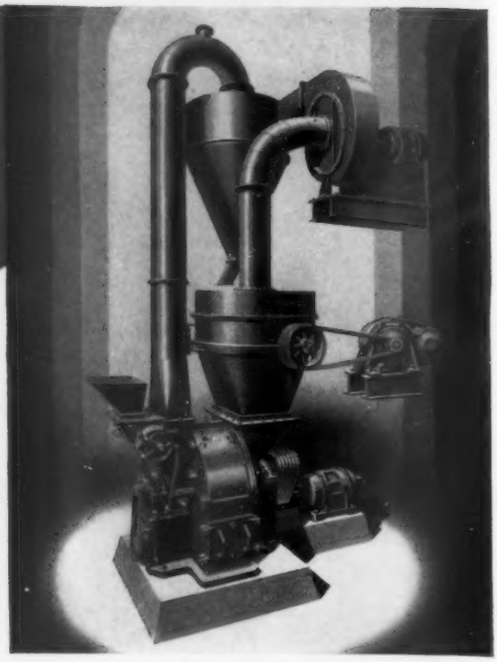
Address .....

City ..... *State* .....



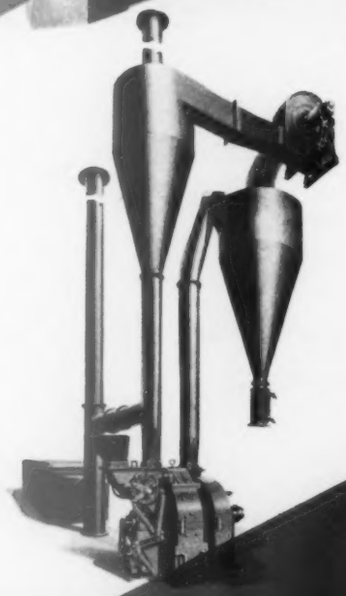
BOWL MILL

Latest Raymond development. Has revolutionized modern methods of coal grinding and direct firing.



WHIZZER TYPE IMP MILL

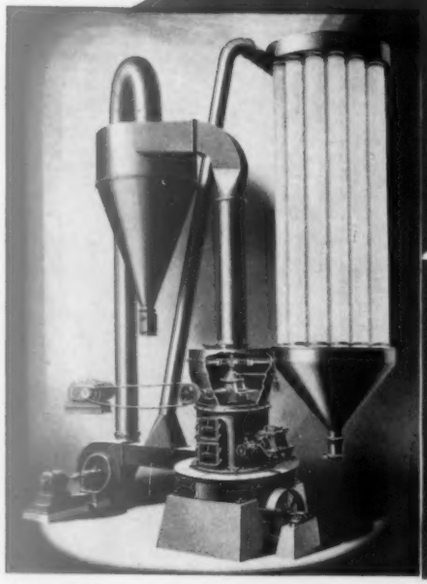
With variable speed control on separator for giving wide range fineness.



FLASH DRYING

Dries and pulverizes simultaneously, removing as high as 80% moisture from wet materials.

50 YEARS

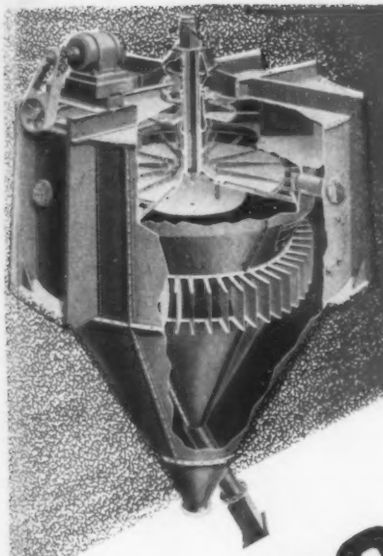


ROLLER KILN MILL

For grinding non-metallic minerals and drying product.

WHIZZER TYPE ROLLER MILL

For custom grinding plants in producing several grades of material with one mill.



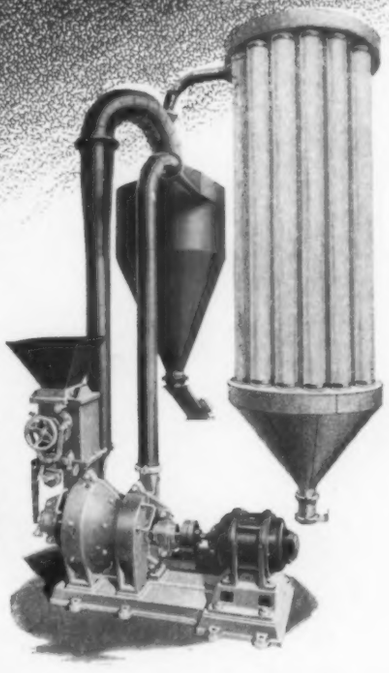
WHIZZER SEPARATOR

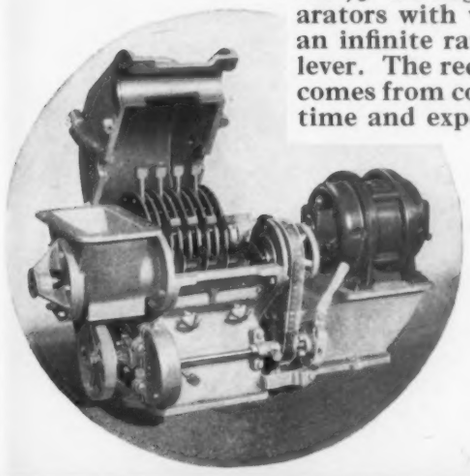
High efficiency-type of centrifugal classifier for closed circuit grinding operations with any mill.

OF LEADERSHIP

1887 1937

ON our jubilee anniversary, we present the most advanced line of equipment known to industry for the production of powdered materials . . . from giant coal grinding units that run as smoothly and silently as a modern motor car to midget pulverizers that automatically grind and classify minimum quantities of manufactured products . . . kiln mills that dry and grind in one operation . . . flash dryers that remove high percentages of moisture from a material during a 10-second pass through the machine . . . mills that make "micron materials" testing 99.9% through 400-mesh . . . whizzer separators with variable speed control that give an infinite range of fineness at the turn of a lever. The record economy of Raymond mills comes from cost-reducing features which only time and experience could develop.





SCREEN MILL

Built in several sizes for grinding small capacities of soft materials.

No. 0000 PULVERIZER

For pulverizing and classifying chemicals, dry colors and dyestuffs. May be equipped for drying and grinding.

COMBUSTION ENGINEERING COMPANY, Inc.

RAYMOND PULVERIZER DIVISION

1321 North Branch Street CHICAGO

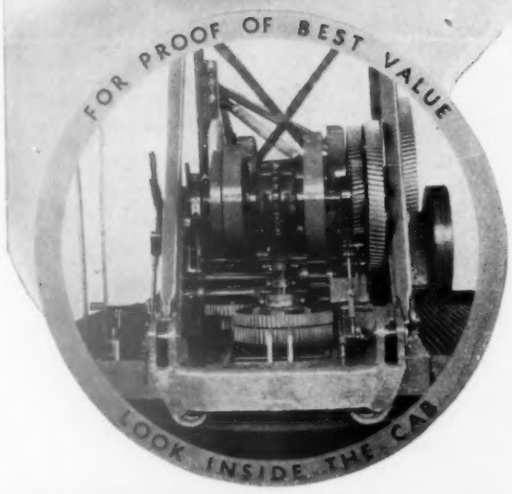
Sales Offices in Principal Cities

Canadian Representative: Combustion Engineering Corporation, Ltd., Montreal

BAY CITY PERFORMANCE HAS SOLD OUT
PRODUCTION FOR MANY WEEKS AHEAD

and still the orders pile up!

for Bay City "20"

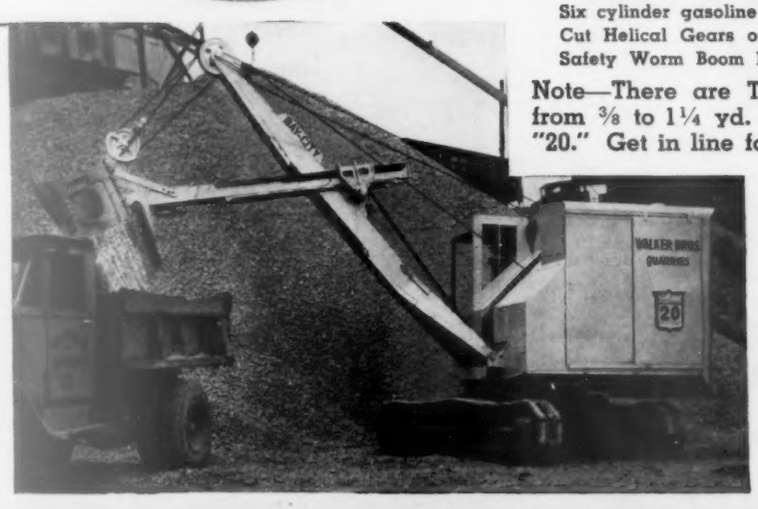


full revolving—full 3/8 yd. bucket—safe 4-ton crane loads . . . . . .

Yes—we're chock-a-block with orders for weeks ahead, and proud of it! It goes to prove that Bay City "20" is the biggest buy in small shovels today. For here's a "Big-little" shovel that has features of construction and operation found in no other 3/8-yarder. It tops its field in its weight and class. Look over these features—use your own judgment!

- Compact Design—Yet plenty of elbow room.
- Elimination of useless "dead weight"—by alloy steels and heat treating.
- Anti-friction bearings—on all machinery shafts and boom point sheaves.
- Chain Crowd—positive and independent—costs more but worth it.
- Drop Forged crawler shoes (14" wide) long wearing life.
- Unit Cast Car Body and Machinery Table of nickel-manganese steel, totally heat treated—available on no other light 3/8 yd.
- Six cylinder gasoline or Diesel Power—"E-Z" Clutch Control.
- Cut Helical Gears on all drum shafts—Helical gear drive, in oil.
- Safety Worm Boom Hoist—Positive Swing Lock—Cab in any position.

Note—There are TEN Models of Bay City Shovels, sizes from 3/8 to 1 1/4 yd. sizes—but no better buy than Bay City "20." Get in line for yours—for profits!



Recent Quantity Purchases:
N. Y. State Pub. Wks. Dept., 8
New Zealand Pub. Wks. Dept., 8

BAY CITY SHOVELS Inc. (Eastern Offices, Roselle, N. J.) BAY CITY, MICH.

Owen RAISES STANDARDS

in Digging and Handling

facts just off the press

Speed Your Copy—mail this coupon Today!

The OWEN BUCKET CO. 6050 Breakwater Ave. Cleveland, O.

Company _____

Address _____

City _____ by _____

170 STURTEVANTS

ON HIGH-EARLY AND REGULAR CEMENT

Why

HAS THE STURTEVANT MILL CO. SOLD 170 AIR SEPARATORS FOR CEMENT ALONE?

Has it been a question of price? A better Separator? A superior knowledge of its applications? The answer to the first question is **NO!** To both other questions it is **YES!**

A better Separator is but half the reason—knowledge based upon research and the practical experience of these many installations has not only taught us to understand and meet the many problems involved in Cement manufacture but how to design a machine peculiarly adapted to these special requirements and apply it to modern needs.

With a perfected and flexible Separator for particle size control we can improve the process from Kilns to Silos. No matter what pulverizers are used, there is one best method for obtaining results and we have made it our business to find that method. Thus it resolves itself into an engineering problem of major importance both in separator design, placement and application besides a thorough knowledge of cement manufacture and pulverizer technique. These are the plus values, obtained without cost to purchasers of Sturtevant Separators and worth more than the Separator itself.

Let us survey your plant (no charge) and make recommendations which may surprise and please you as it has all of our customers.

STURTEVANT MILL COMPANY
HARRISON SQUARE BOSTON, MASS.

LONG adds another unusual achievement to its LONG list

Outstanding in a long list of achievements of The M. A. Long Co. are the new crusher and storage buildings constructed last winter at the Nazareth, Pa. plant of the Lone Star Cement Corp. Despite prevailing sub-freezing temperatures this modernization program was carried out on a fast summer construction schedule, a record made possible by skillful forming, adequate heat protection and the modern methods of construction used by this company, which has been setting new standards of building in the past decade.

Whether a construction project is large or small the M. A. Long Co. plans and schedules all the operations and dovetails them to assure economical erection costs and the minimum delay to plant operations regardless of weather conditions. In the erection of these buildings the M. A. Long Co. organization prepared all detailed plans.

The storage building is 75 ft. wide, 114 ft. long and 76 ft. high from the top of the footings to the crown of the arched roof. The storage space is formed by retaining walls 25 ft. high, the south wall being of the cantilever type. The feature of this building is the parabolic arch-roof which has a 79-ft. span with a 16-ft. rise. The use of high-early-strength cement resulted in a definite saving in heat-protection expense. Standard Portland cement was used in the crusher building which is of slip-form construction.

Write for full information regarding Long Building service which includes the design of Cement Plants, Lime Plants, Storage Plants, Grain Elevators, etc.

The M. A. LONG *Co.*

Engineers and Constructors

10 W. CHASE ST., BALTIMORE, MARYLAND

ALLENTOWN CHICAGO

Speed Up

IF YOU ARE USING A TELSMITH CRUSHER PURCHASED AFTER JAN. 1923* and BEFORE JAN. 1931*

• • • regardless of its size, your Telsmith Primary Breaker and/or Reduction Crusher *capacity can be increased 25 per cent*, also greatly improving the quality of the product turned out.

Telsmith makes it possible for you to modernize your crusher to meet today's demands. Such outstanding Telsmith engineering advancements as—*roller bearing countershaft, cut steel drive gears, improved oiling system* may now be incorporated into *your* crusher. These great developments allow *much higher crushing speeds* . . . not merely more gyrations per minute but more actual crushing *by impact* . . . resulting in better cubing of the product, with less oversize.

This modernization service applies only to Telsmith *steel* crushers—introduced by Telsmith as standard design in 1923. Because cast iron and semi-steel crushers are vulnerable to breakage by tramp iron, we do not recommend that older crushers be operated at modern high speeds. *It will pay you to write for full facts and details.*

*In Jan. 1923 Telsmith adopted steel construction. In Jan. 1931 Telsmith current high-speed models were announced.

SMITH ENGINEERING WORKS, 504 E. CAPITOL DRIVE, MILWAUKEE, WIS.

Associates in Canada: Canadian Ingersoll-Rand Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver.

50 Church Street, New York City
412 Westinghouse Bldg., Pittsburgh, Pa.
201 N. Wells, Chicago, Ill.
Abrams-Anderson Co., Detroit, Mich.
1013 Commercial Trust Bldg., Philadelphia, Pa.
Brandeis M. & S. Co., Louisville, Ky.
81 Binney St., Cambridge, Mass.
L. V. Fraley & Son, St. Louis, Mo.

TELSMITH CRUSHERS

1937 opens new opportunities in the sale of ready-mixed Concrete. Protect your business in sand, gravel, stone and cement and gain bigger volume now. In 1937 Rex Modern Cone-End Drum Moto-Mixers and Agitators offer new opportunities for volume, new low costs in any type of ready-mix business.

Now with the rising volume in construction greater sales of sand, gravel, stone and cement are available with Rex Moto-Mixers. They are the equipment you need for the modern, profitable way of selling concrete.

Rex modern Cone-End Drums are producing better concrete that is finding ready and wide markets.

Rex lighter weight by use of Man-Ten steels means bigger pay loads and lower ton-mile costs.

New, smoother, streamlined design makes a better advertisement for your business on the street.

READY-MIXED CONCRETE

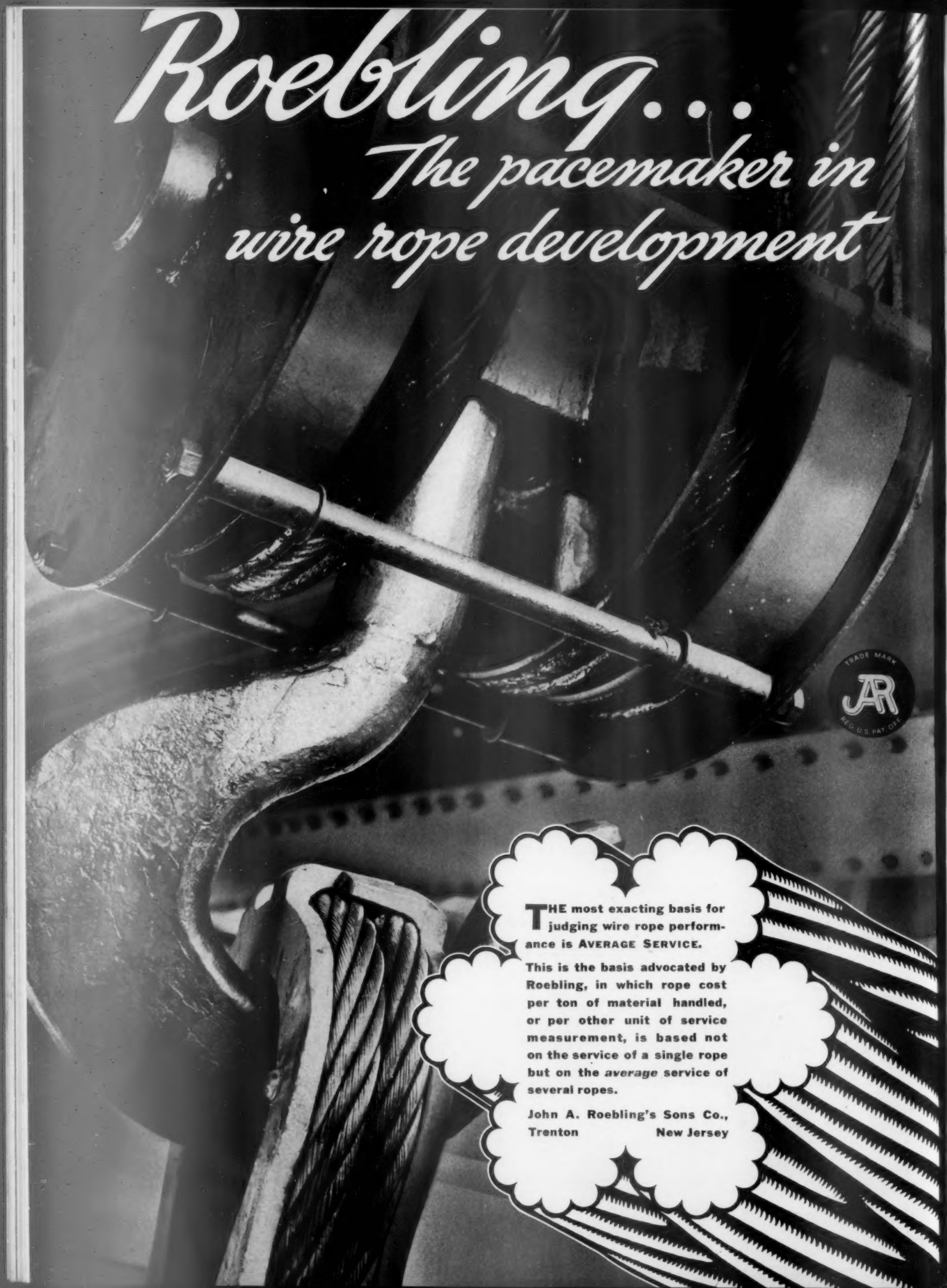
Send today for a copy of the book, "Rex Moto-Mixers and Agitators." It describes the modern way to secure a better margin on this modern profitable method of selling cement and aggregates. It also illustrates Rex Moto-Mixer features.

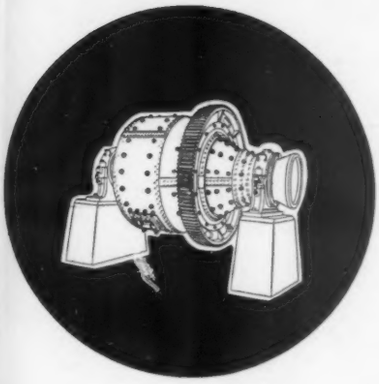
CHAIN BELT COMPANY
1646 W. Bruce St. Milwaukee, Wis.

REX The Up-to-date Method of Handling Concrete

Moto-Mixers

CHAIN BELT COMPANY *of Milwaukee*


Roebling...
The pacemaker in
wire rope development
TRADE MARK
JAR
REG. U.S. PAT. OFF.
THE most exacting basis for judging wire rope performance is AVERAGE SERVICE.
This is the basis advocated by Roebling, in which rope cost per ton of material handled, or per other unit of service measurement, is based not on the service of a single rope but on the *average* service of several ropes.
John A. Roebling's Sons Co.,
Trenton New Jersey



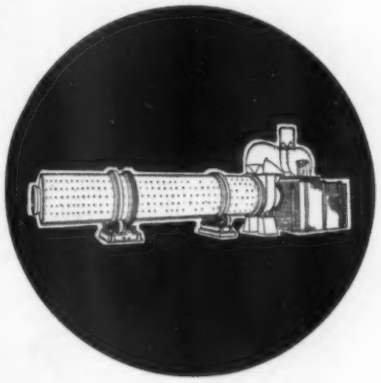
Pulverizer Maintenance Costs—only 2 cents per ton!

The Hardinge Mill holds the record for low maintenance costs for grinding ceramic materials, limestone, clay, cement, clinker, coal and ores. This also means lowest overall grinding costs.

When grinding dry—the reverse current air classifier keeps a dense "fog" of material between balls or pebbles at all times, preventing metal to metal (or pebble to pebble) contact.

When grinding wet—the cones keep the mass in circulation without rubbing against the heads which reduces both ball and liner wear and increases grinding efficiency.

Write for Bulletin 13C.



If Drying Efficiency is 40% It Can Be Raised to 70%

Unless you have made a "heat balance" recently or installed a modern Ruggles-Coles Dryer, the chances are, your drying efficiency is off.

A difference of 10% in drying efficiency (to say nothing of 30%) may pay for the cost of revamping or replacing your dryer in one year's time.

Rotary dryer performance has changed considerably in the last few years.

Control systems—mechanical improvements—more efficient heat transfer methods, all contribute to build up overall efficiency without increase in capital cost. Ruggles-Coles Dryers incorporate all these improvements. What do you dry?

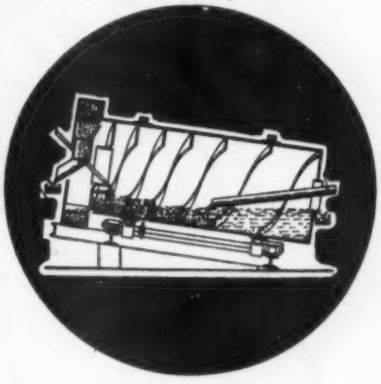
A Scrubber That Reduces Clay Balls to Slime—in *one pass*

Mass Weight of Material, causes mass pressure to disintegrate thoroughly without crushing or grinding.

High Speed, keeps the mass extremely live—greatly reduces the water required.

Conical Ends, assure a quick and positive feed and discharge—with a vertical and lateral circulation of the mass, to speed up passage through drums.

No Internal Moving Parts, no grates, elevating buckets, internal shafts or cutting blades —means negligible maintenance and low power costs.

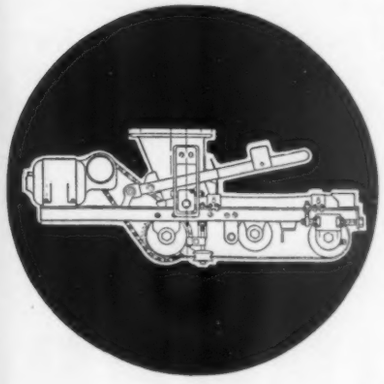


Classifier and Washer Capacity Double Per Square Foot of Floor Space

For that indoor job of classifying or washing—silt from sand—impurities from salts or fines from coarse particles, the Hardinge Counter Current Classifier is the ideal unit to use. It is easily acid-proofed—can be made practically gas tight. There are no dead corners to become stagnant or mechanical parts in the classifying zone to clog or jam.

Separations as coarse as 10 mesh or as fine as 325 mesh have been easily secured in a unit that requires half the floor space of other standard mechanical Classifiers.

Write for Bulletin 39A.



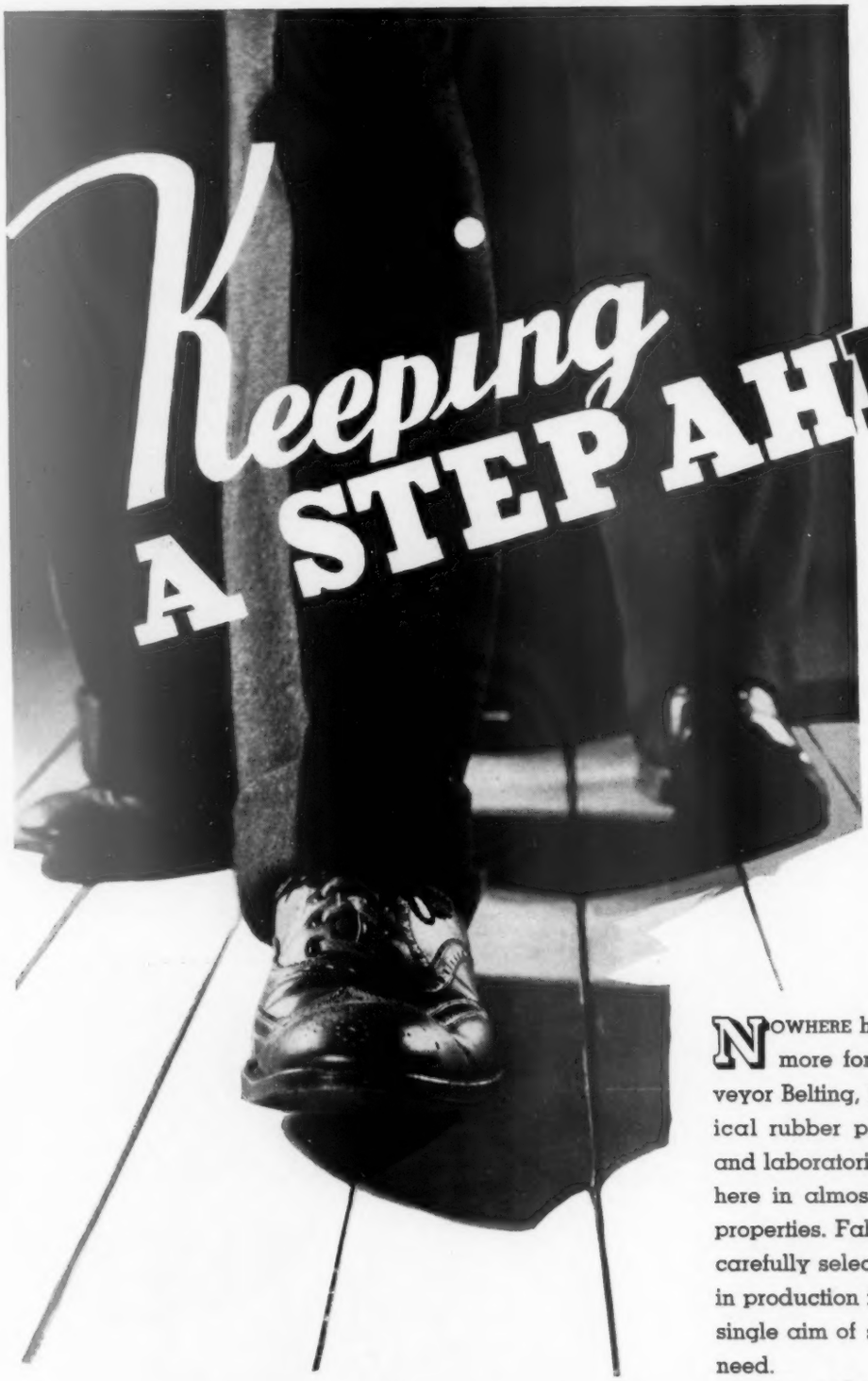
A Feeder That Does The "Impossible"

No one would believe that a Hardinge Constant Weight Feeder installed in front of almost any Pulverizer will increase the capacity of that pulverizer 10 to 25%—unless he installed the feeder or checked the results himself. Users have done just that and reported the capacity increase cited. That is not all! A record of the weight fed is kept as well. The unit is sturdy and inexpensive.

When an item costing 5% of the unit it serves can increase capacity 15%—it is worthy of your investigation now!

HARDINGE COMPANY
INCORPORATED

New York, N. Y. 122 E. 42nd Street
San Francisco, Cal. 501 Howard Street
York, Pa. Main Office and Works
Denver, Col. 817-17th Street
Chicago, Ill. 205 W. Wacker Drive



Keeping A STEP AHEAD

WITH EVERY AID OF MODERN SCIENCE

NOWHERE has applied science accomplished more for users of Transmission and Conveyor Belting, Hose, Packing and other mechanical rubber products than in Republic's plant and laboratories. Compounded rubber is made here in almost limitless variations of physical properties. Fabrics and other reenforcements are carefully selected for specific uses. Every stage in production is scientifically conducted with the single aim of suiting the product to a particular need.

Republic's Quality has been kept foremost through constant and exhaustive research of industry's requirements. No demand of mechanical rubber is too great for Republic to meet.

The REPUBLIC RUBBER Company

YOUNGSTOWN • OHIO

Manufacturers of HOSE
BELTING • PACKING
MOLDED PRODUCTS.

ORDER REPUBLIC RUBBER PRODUCTS FROM YOUR DISTRIBUTOR

FOCUS ON THIS

TRAYLOR
TY REDUCTION CRUSHER

During a period of over thirty years, Traylor has taken the lead in the introduction of crusher improvements, but in no instance has success come as speedily and as completely as in the case of our Type TY Reduction Crusher.

It "has everything," sells for a most reasonable price and performs in every way as operators expect.

If you have a reduction problem, don't fail to closely investigate this machine—it will pay you! Bulletin No. 112 tells the whole story—write for your copy now!

TRAYLOR
ENGINEERING & MFG. CO.
Allentown, Pa.

NEW YORK CITY
3916 Empire State Bldg.

CHICAGO
2151 One La Salle St. Bldg.

SALT LAKE CITY
101 West Second South St.

LOS ANGELES
919 Chester William Bldg.

SEATTLE
6311 22nd Ave., N. E.

Timmins, Ontario, Canada
P. O. Box 113

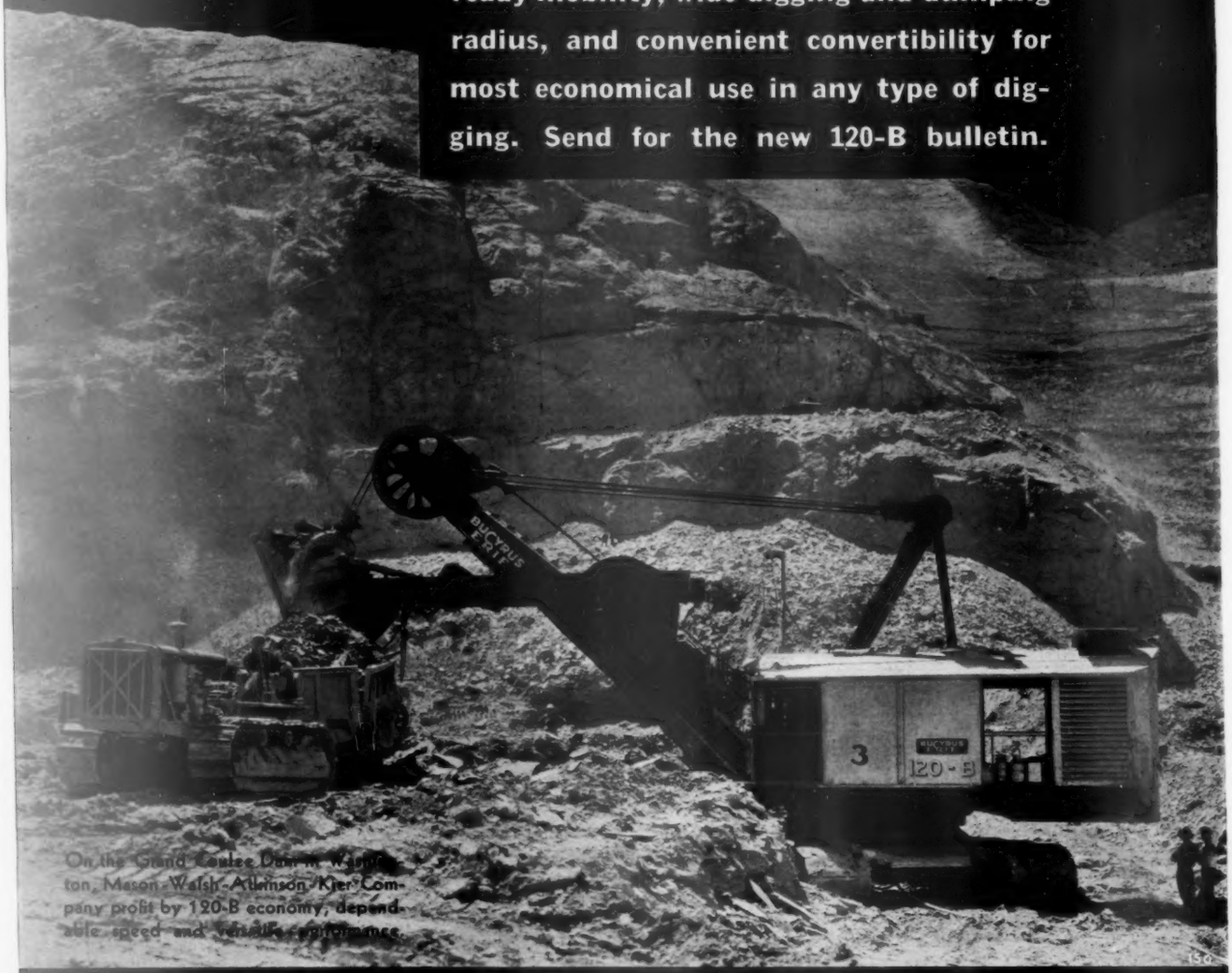
MANILA MACH. & SUPPLY CO.
Manila and Baguio, P. I.

Robins Conveyors (So. Africa) Inc.
Johannesburg, Transvaal, S. A.

Export Department—104 Pearl St., New York City.
Foreign Sales Agencies: London, Lima, Sao Paulo, Rio de Janeiro, Buenos Aires, Santiago, Valparaiso, Antofagasta, Iquique, Oruro
European Works—Usines Carels Freres, Ghent, Belgium

BUCYRUS-ERIE

MANY new features put the 120-B out in front in power, speed, output capacity and money-saving efficiency. This famous 4-yard, heavy-duty shovel offers quick accelerating swing and positive spotting, ready mobility, wide digging and dumping radius, and convenient convertibility for most economical use in any type of digging. Send for the new 120-B bulletin.



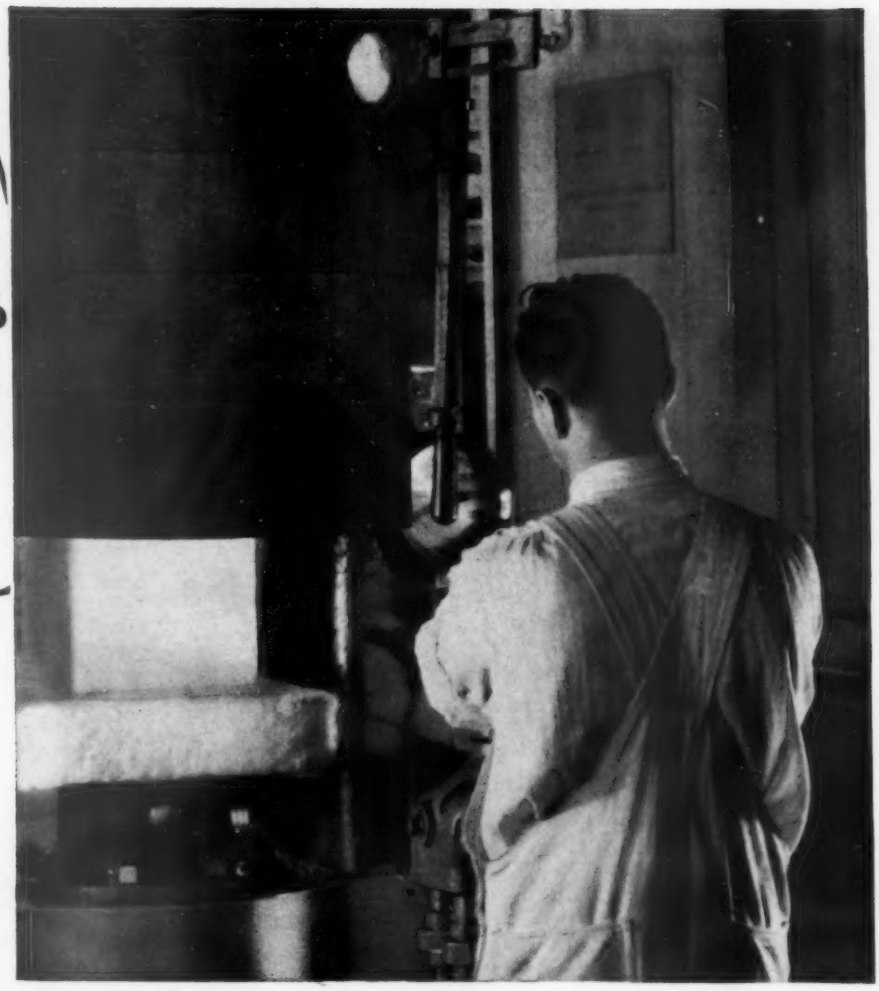
On the Grand Coulee Dam in Washington, Mason-Walsh-Atkinson-Kier Company profit by 120-B economy, dependable speed and versatile performance.

BUCYRUS ERIE

EXCAVATING, DRILLING, AND MATERIAL HANDLING EQUIPMENT... SOUTH MILWAUKEE, WISCONSIN, U.S.A.

Now Available . . .

COMPLETE
DRY ICE PLANTS
UTILIZING WASTE GASES FROM LIME AND CEMENT PLANTS—



DESIGNED and BUILT BY LUMMUS

The Lummus Company, for more than forty years designers and builders of chemical equipment, is now in position to design and construct complete plants for the production of dry ice from lime and cement plant waste gases.

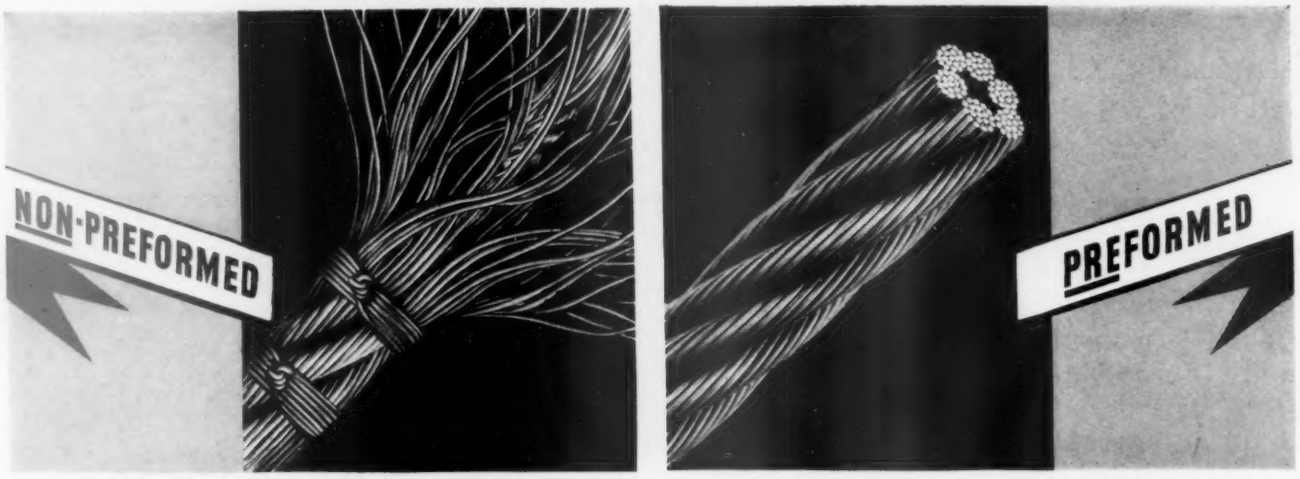
Lummus Dry Ice Plants incorporate improved methods of purifying waste gases and producing dry ice. These Lummus plants may be built and operated in any part of the United States, without geographical restrictions or operating royalties.

Dry ice offers attractive profits with moderate investment and low operating costs. Write, telephone or wire for further information.

THE LUMMUS COMPANY, 50 CHURCH STREET, NEW YORK, N. Y. • BUSH HOUSE, ALDWYCH, LONDON, W. C. 2

LUMMUS

CHEMICAL PROCESS EQUIPMENT



THERE ARE SEVERAL REASONS WHY WE RECOMMEND *Preformed* WIRE ROPE

The foremost reason for recommending preformed wire rope is that for many applications it gives much *greater dollar value. . . .* But there are many other reasons, too. For one: it is *safer* for the workmen to handle.

Broken crown wires don't bristle out to jab men's hands. Then too, the preforming process tends to *eliminate the destructive internal stress.* This elimination also means that preformed rope . . .

- **requires no seizing**
- **resists kinking**
- **is easier to splice or socket**
- **is much easier to handle**

AMERICAN CABLE COMPANY, INC.
AMERICAN STEEL & WIRE COMPANY
BRODERICK & BASCOM ROPE CO.
COAST CABLE COMPANY
E. H. EDWARDS COMPANY
HAZARD WIRE ROPE COMPANY
A. LESCHEN & SONS ROPE COMPANY
MACWHYTE COMPANY
PACIFIC WIRE ROPE COMPANY
ROCHESTER ROPES, INCORPORATED
JOHN A. ROEBLING'S SONS COMPANY
UNION WIRE ROPE CORPORATION
WICKWIRE SPENCER STEEL COMPANY
WILLIAMSPORT WIRE ROPE COMPANY
WIRE ROPE CORPORATION OF AMERICA
WIRE ROPE MANUFACTURING & EQUIPMENT CO.

A NORTHWEST SHOVEL CRANE *or* DRAGLINE *for every* QUARRY *or* PIT PROBLEM!

If it's a big stripper you need, Northwest has it—or if it's a ¾ yd. shovel, crane or dragline—or anything in between there is a Northwest ready to go to work in your pit and show you results the like of which you never experienced before.

Northwests bring you an exclusive combination of features that mean real reductions in pit costs.

- Self cleaning crawlers that get over rough floors without jamming up.
- Ball and roller bearings that assure the maximum transmission of engine power to the work.
- Welded shovel booms (no Northwest welded boom has ever failed) and a shovel crowd that utilizes power other shovels waste.
- High strength alloy steel crane and dragline booms that mean greater pay loads.
- Heavy duty, slow speed engines that hang on under drag-down loads.

These are not just talking points. They are but a few of the real Northwest advantages, that have been proved in quarry service. Challenge us to prove them to you. It will be to your advantage.

NORTHWEST ENGINEERING COMPANY

The world's largest exclusive builders of gasoline, oil, diesel, or electric powered shovels, cranes, draglines, pullshovls, and skimmers

1703 Steger Bldg.
28 E. Jackson Boulevard
Chicago Illinois

GASOLINE • ELECTRIC • DIESEL • OIL

Built in a range of 15 SIZES ⅜ yd. capacity and Larger

NORTHWEST

"GREATEST DISCOVERY in Road Construction in Years"

Means Big New *Profits* for You!

The construction of soil-stabilized secondary roads throughout the country is the recently announced aim of the U. S. Bureau of Public Roads, who consider it "The Greatest Discovery in Road Construction in Years." Most states and counties, too, have scheduled extensive mileages of stabilized road projects. Consequently, hundreds of miles of stabilized roads will be built this year and millions of tons of aggregates will be used in their building.

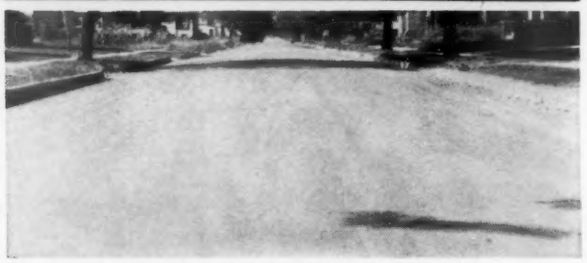
The simplest, most convenient and best way to build a stabilized road is with uniformly-graded ready-mixed material. Engineers prefer this ready mixed material. In fact, they want it so badly that, unless local producers make plant-mixed material available to them, they will be forced to develop their own pits and erect their own stabilization plants.

Road money spent for stabilization will buy 10 to 20 times as much aggregate as money spent for paving, so stabilization has actually opened the greatest market ever known to aggregates producers.

Now is the time to prepare your plant. Only a small investment is required—you already have much of the equipment needed. You'll get the greatest dividends you've ever received—this year and each succeeding year. For stabilization is here to stay!

The companies listed below are ready and anxious to help you get started. Write today for detailed information.

Markets Aplenty



For City Streets

Rural Roads

Park and Private Drives

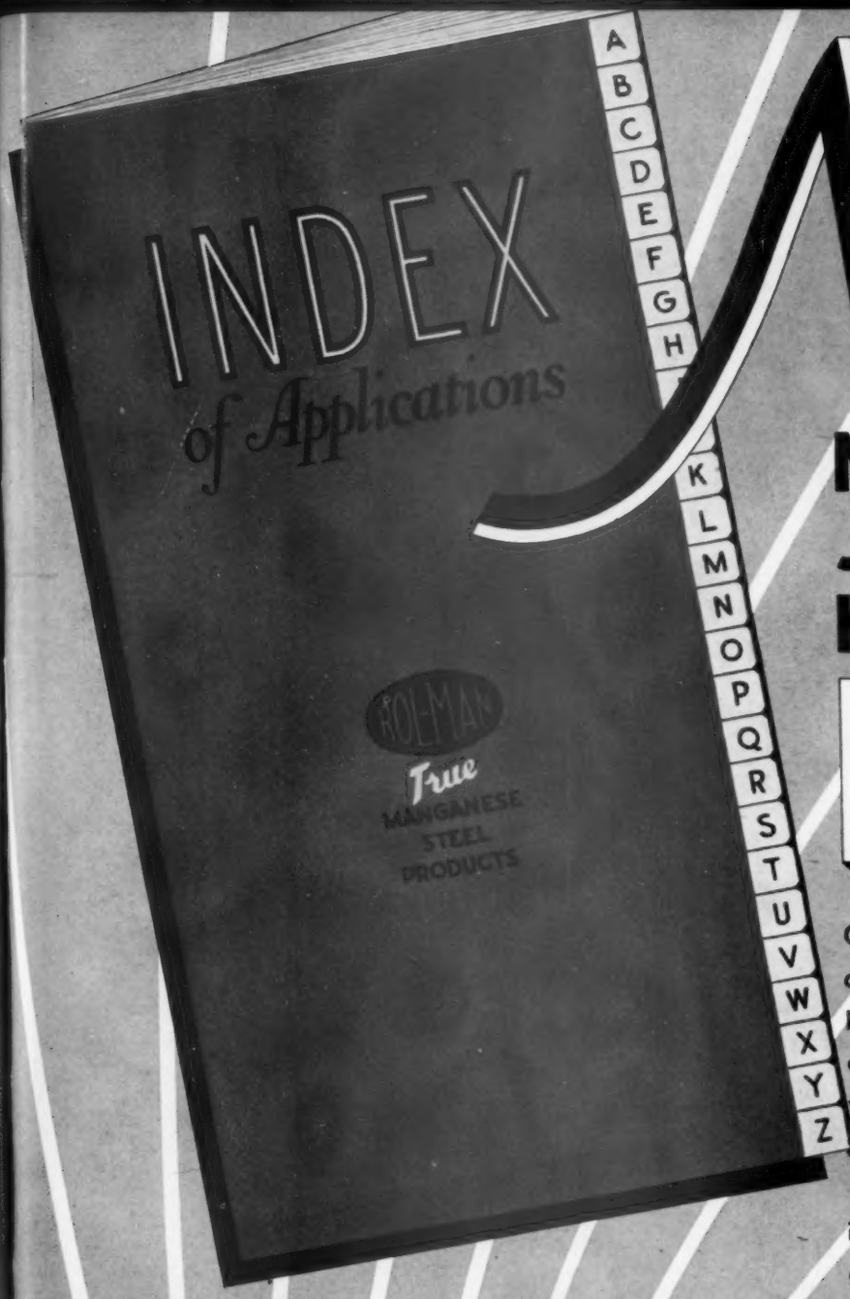
Factory and Public Parking Areas and every other place where a firm, dustless, all weather surface is desirable

Calcium Chloride Association

The Dow Chemical Company . . . . Midland, Michigan
Solvay Sales Corporation . 40 Rector St., New York City
The Columbia Alkali Corporation . . . Barberton, Ohio
Michigan Alkali Company . 60 E. 42nd St., New York City

CALCIUM CHLORIDE

FOR STABILIZING ROAD SURFACES



NEW

Manganese Steel Handbook

FREE

Only 32 pages, but crammed full of information as to "where" and "how" and "why" Rol-Man will last longer where tough-hardness, strength and abrasion resistance is required. Tables show analysis of Rol-Man Rolled True (11%-14%) Manganese Steel and compare its "effective strength" with other metals. Hundreds of parts we have made in the past 15 years are alphabetically listed, to give a comprehensive picture of the type of service where Rol-Man excels. If you are troubled with the bugaboo of excessive wear and frequent breakage of any forged, rolled or pressed steel part, we feel sure this booklet will be most interesting.

Rol-Man Rolled, True (11% to 14%) Manganese Steel has practically double the strength and abrasion resistance of cast manganese steel, ten times the "effective strength" of mild steel and three and a half times that of heat treated nickel steel. It is also available in Welding Rod and Threaded Bolts.

True
MANGANESE STEEL

FORGINGS Rolled Products ROL-MAN STAMPINGS Wire & Rod Products

MANGANESE STEEL FORGE CO., CASTOR AVE. AND ALLEN ST., PHILADELPHIA

COUPON

FILL IN AND MAIL TODAY

for a copy of Booklet 3R entitled "Index of Applications"

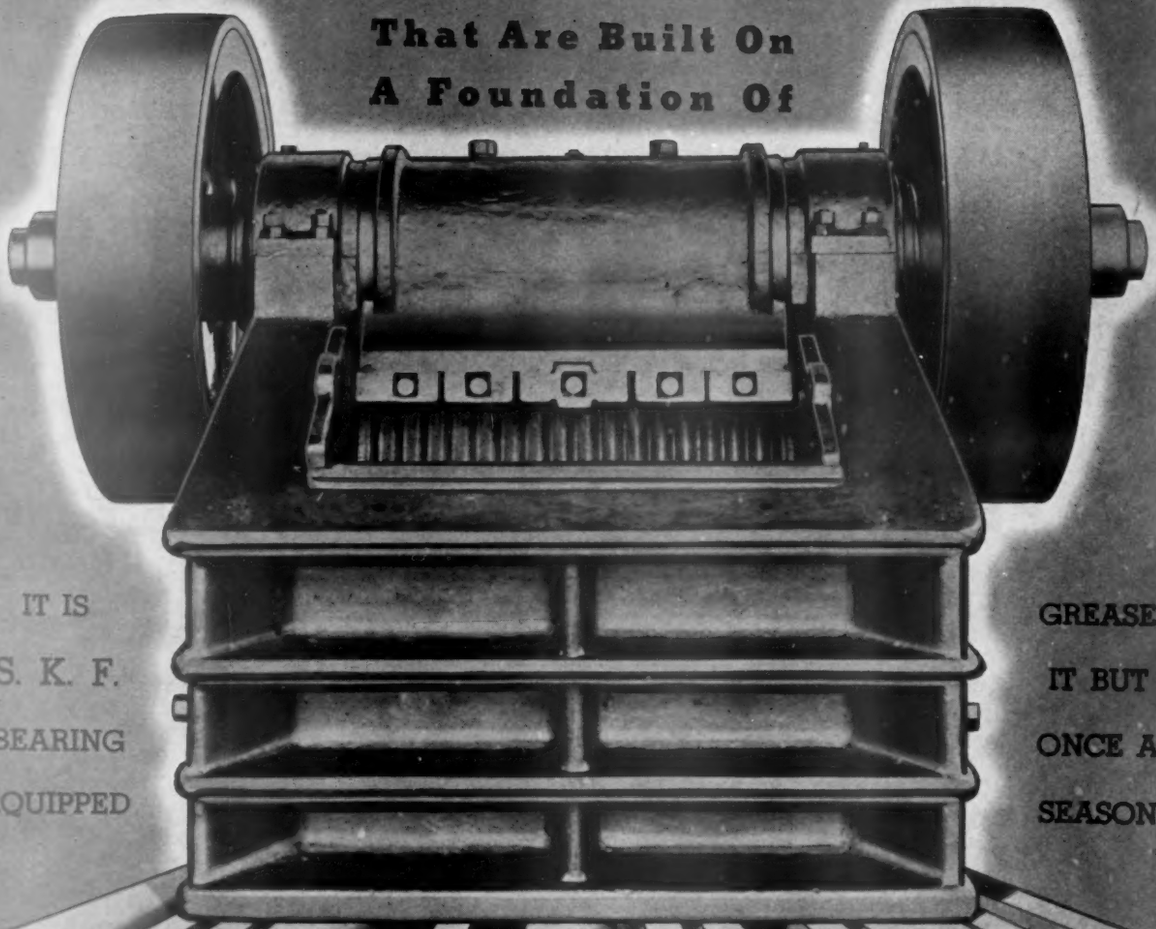
Mr. _____ Title _____

Company _____

Address _____

Buy Cedar Rapids Roller Bearing Crushers

That Are Built On A Foundation Of



IT IS S. K. F. BEARING EQUIPPED

GREASE IT BUT ONCE A SEASON

DURABILITY

IT'S REVOLUTIONARY IN ITS SAVINGS OF LUBRICANTS — A NEW AND PROVEN IDEA, BACKED BY AN OLD NAME

— ASK FOR BULLETIN A-2 —

IOWA MANUFACTURING COMPANY
CEDAR RAPIDS, IOWA

Visit Booth C-23 at the New Orleans Road Show

JOLTING a "Rock-Ribbed" Theory ★ ★ ★ ★

The old rule of thumb method in selecting quarry shovels is to judge their capacity for service by size and bulk. Today this method is no longer safe and economical for the many Lorains in quarries have demonstrated that Capacities depend on Stability and Strength, not Weight . . . Watch a Lorain in a quarry and you can't escape the realization that *dollar for dollar* (in both initial investment and operating cost) a Lorain gets out rock at less cost per ton than many heavier, bulkier machines . . . The Thew Shovel Company, The Universal Crane Company, Lorain, Ohio.

LORAINS—2 to ⅜ yd.— *Move more material, faster, at lower cost*

Model 70K Hug Roadbuilder equipped with 4-yard Excavation Type Hug body.

Whatever Your Requirements

HUG WILL MEET THEM

MORE and more, contractors and dump truck operators appreciate the necessity of specially designed transportation equipment that will reduce their hauling costs to a minimum.

Hug offers hauling units individually engineered to meet *your* requirements—whether they be roadbuilding, batch hauling, dirt and excavation work, stripping, quarrying or any other type of dump truck service. For example, Hug equipment includes such features as the Hug front axle rocker action with the new universal spring shackle; the rugged arc welded "I" beam frame; the set-back wheel design with resulting short turning radius and equalized load distribution; double reduction rear axle; wide variation of transmission speeds from low-low to over-gear drive; heavy duty spring design; bodies and hoists designed to meet a wide range of hauling requirements and built with the chassis as an integral unit.

Write today for complete information and let our engineers show you how Hug can meet your hauling requirements and reduce your hauling costs.

● *Model 87Q with 6-yard Easton Phoenix side dumping Quarry body.*

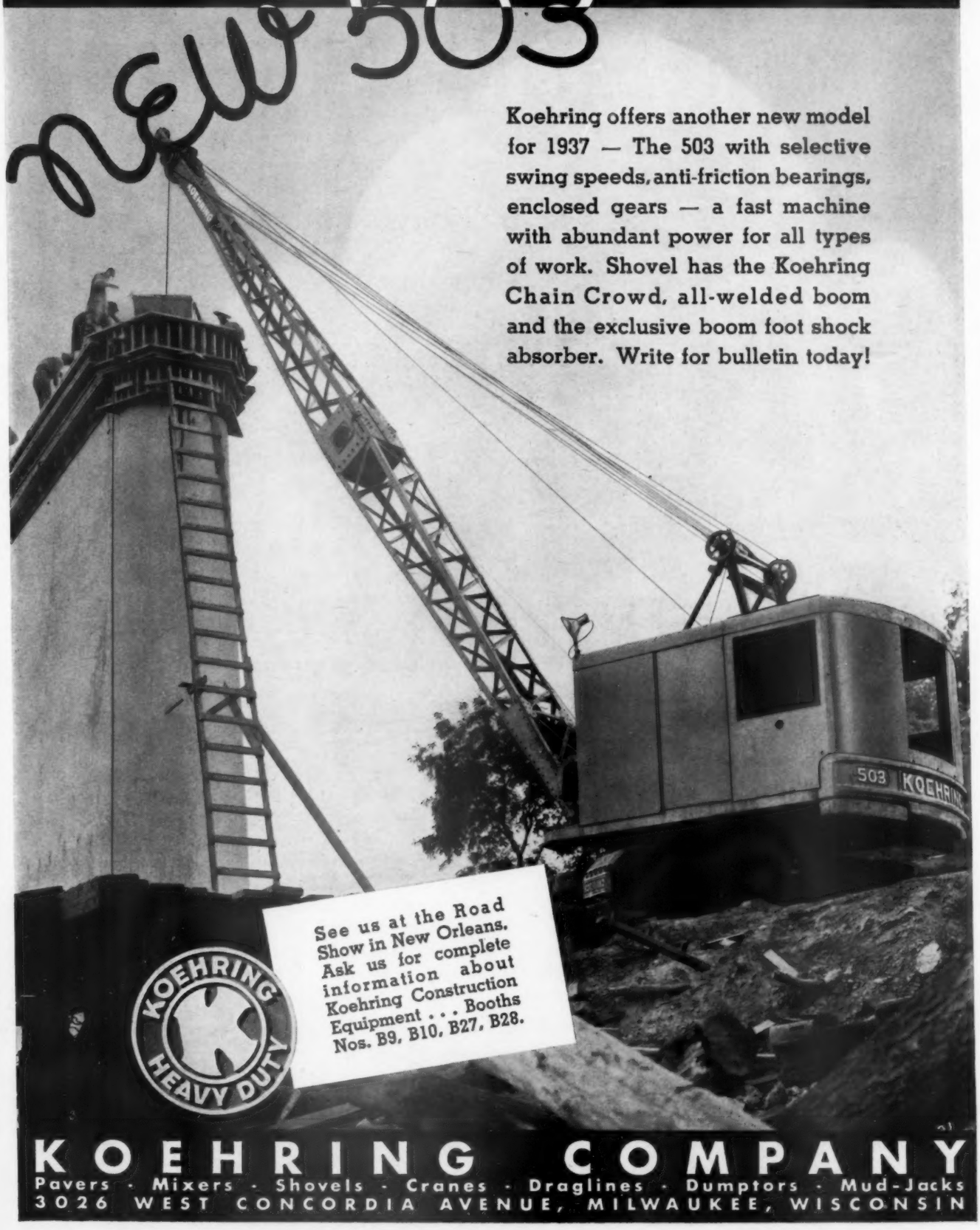
THE HUG COMPANY
501 Cypress St., Highland, Illinois

● *At left: Model 87K Hug Roadbuilder with Hug 5-yard Excavation type body.*

● *At right: Model 87Q with standard 6-yard Hug Scoop-End body, U-shaped "I" beam side braces and equipped with high dumping angle power hoist.*

KOEHRING

New 503



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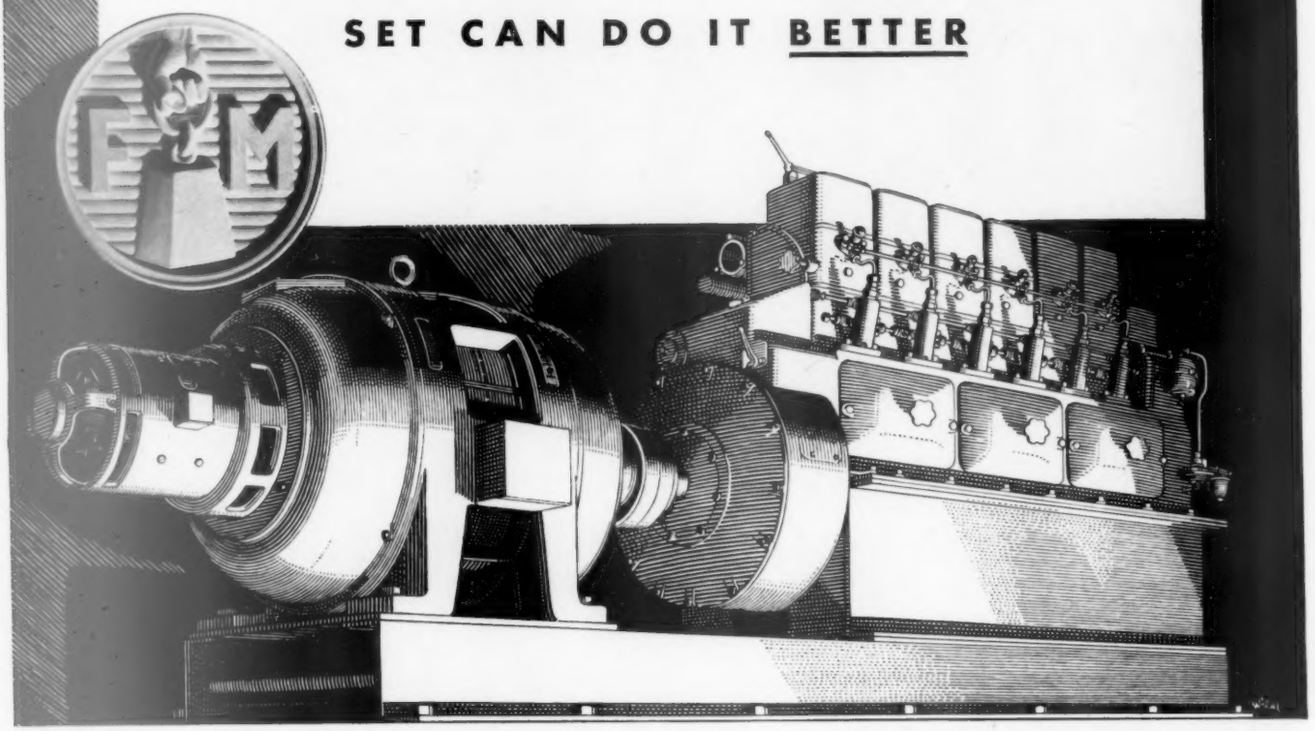

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DIVISION OF
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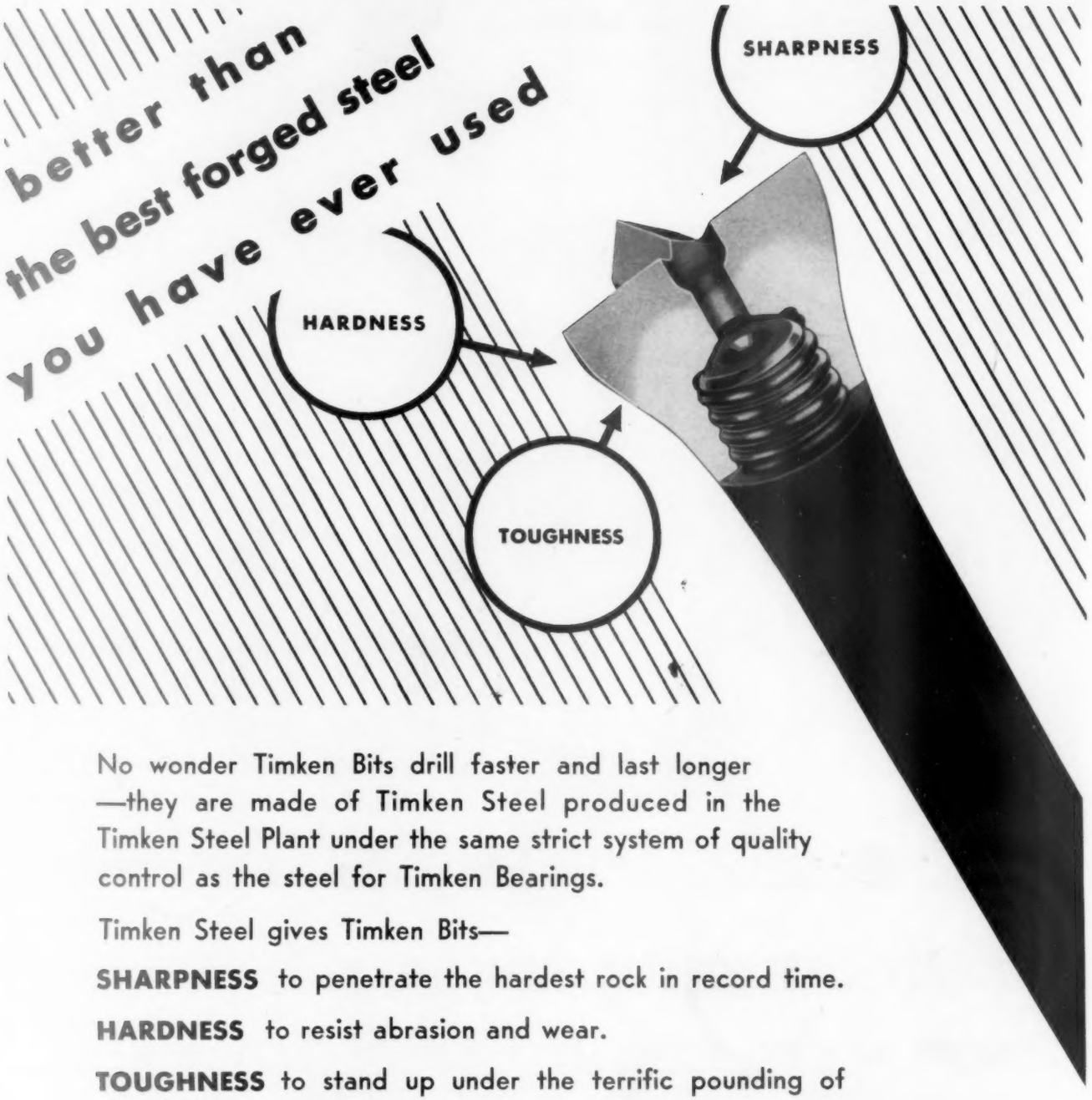

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PIT AND QUARRY

Vol. 29 JANUARY, 1937 No. 7

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Published on the tenth of each month for producers and manufacturers of Cement, Crushed Stone, Gypsum, Lime, Sand, Gravel and other nonmetallic minerals. Copyrighted 1937 by Complete Service Publishing Co., 538 South Clark Street, Chicago, Ill.

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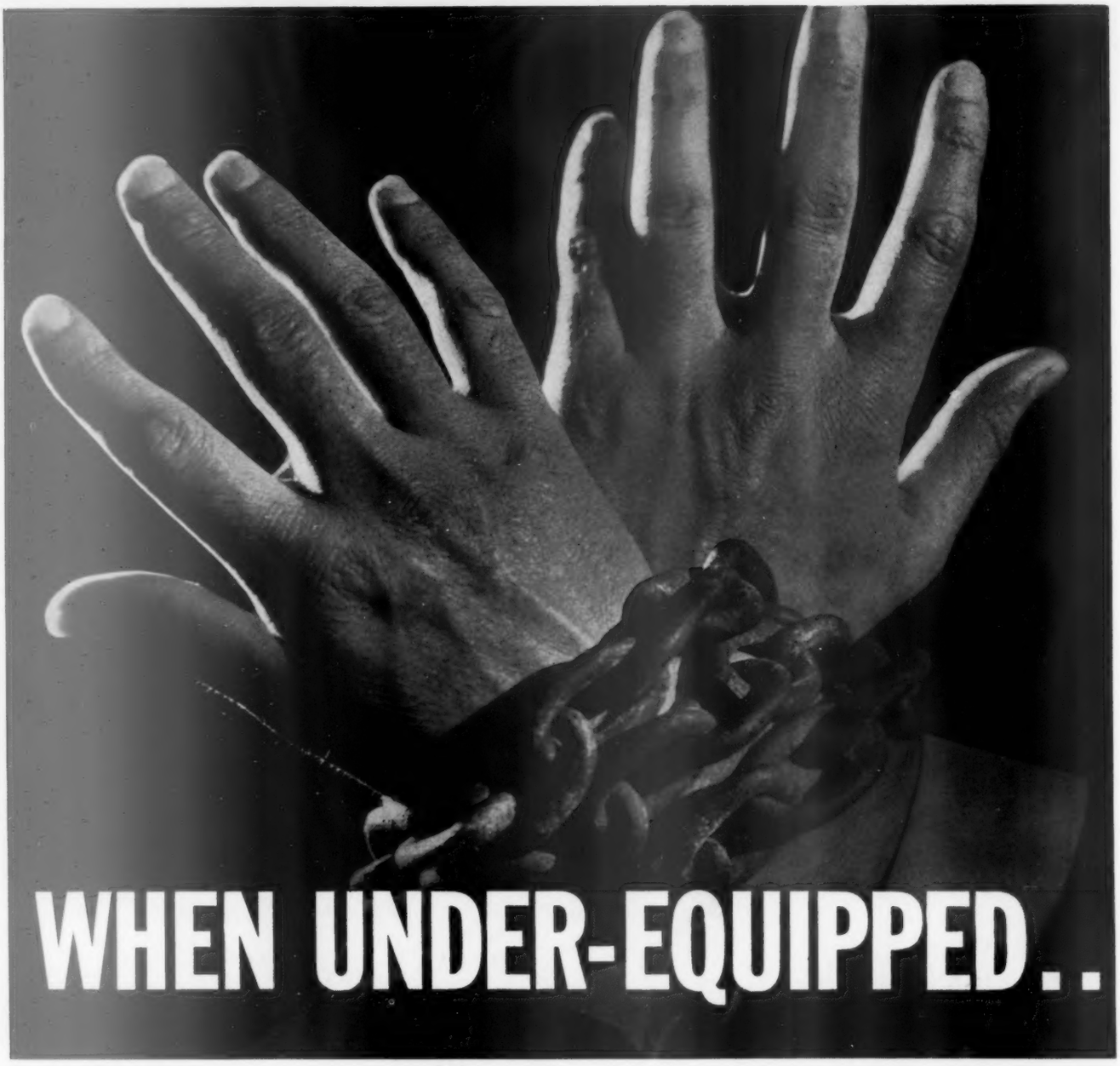

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Crushed Stone Assn. to Convene Jan. 18

ANNUAL GATHERING AT CINCINNATI

Nationally-known speakers, exceptionally well qualified in their respective fields, will discuss subjects of vital significance at the twentieth annual convention of the National Crushed Stone Assn., which takes place Jan. 18, 19 and 20 at the Netherland Plaza Hotel, Cincinnati, O.

Regional vice-presidents will give a survey of conditions in their territories on the morning of the opening day, following the calling of the convention to order by President H. E. Rodes. A. T. Goldbeck, engineering director, and J. R. Boyd, administrative director, will submit their annual reports. The annual greeting luncheon will be held at noon and the afternoon will be devoted to a symposium on *Stone Sand*. The equipment exhibit will formally open in the evening.

On Tuesday morning, Jan. 19, the Columbia Quarry Co., St. Louis, Mo., will receive its award as winner of the association's safety contest. M. J. Gormley, assistant to the president, Assn. of American Railways, will speak, while the remainder of the morning session will be devoted to a discussion of the growing silicosis menace. Speakers on the subject will include Dr. R. R. Sayers, U. S. Public Health Service, and Theodore C. Waters, a member of the legal firm of Stockbridge & Waters, Baltimore, Md.

The manufacturers' luncheon will be held at noon on Tuesday with C. S. Huntington of the Link-Belt Co., chairman of the manufacturers' division, presiding. The afternoon will be devoted officially to viewing the equipment exhibit.

On the final day, Wednesday, Jan. 20, E. F. Kelley of the U. S. Bureau of Public Roads will speak on *Significant Developments in Highway Investigations*, while C. L. McKesson, vice-president of the American Bitumuls Co., San Francisco, will present a paper entitled: *Stabilizing Quarry Fines for Base Construction.*

The future policies of the state and federal governments will be revealed in the opening talk Wednesday afternoon by W. C. Markham, executive secretary of the American Assn. of State Highway Officials. The Robinson-Patman and Walsh-Healy acts will be explained by John C. Gall of the National Assn. of Manufacturers.

Committee reports and election of officers for 1937 will conclude the business of the convention, with the annual banquet scheduled to close the events of the week in the evening.

Cement Imports Forcing Prices Downward Again

Foreign-cement competition along the eastern seaboard and gulf is again being strongly felt and as a result Portland cement prices in recent weeks have been reduced in an attempt to combat the lower prices prevailing on incoming shipments.

In the New York metropolitan area the cut amounted to 33 c. per bbl., in Boston the reduction was 12 c., while at Pensacola and other gulf ports reductions of 25 c. per bbl. were posted.

A. C. Wilby Resigns to Join Carnegie-Illinois

For a number of years assistant to the president of the Universal Atlas Cement Co., Chicago, Ill., A. C. Wilby has resigned to become manager of public relations in the Chicago area of another U. S. Steel Corp. subsidiary, the Carnegie Illinois Steel Corp.

Mr. Wilby is well known in the cement industry and in industrial circles as well. He joined the steel corporation in 1909 as a salesman in Iowa and has been located in Chicago since 1915.

★ New storage silos are being erected at the Sandt's Eddy plant of the Lehigh Portland Cement Co., according to Raymond R. Bear, vice-president and chief engineer.

$800,000,000 Road Program in Prospect

PREDICTION OF T. H. MAC DONALD

Highway construction in the United States may exceed $300,000,000 in 1937. Thomas H. MacDonald, chief of the U.S. Bureau of Public Roads, told the American Association of State Highway officials in December at its meeting in San Francisco. He made the estimate in announcing that the 1937 program includes "introduction of the secondary road improvement program as a part of the permanent highway legislation."

Mr. MacDonald said two principles would be observed:

"First, that the Federal government will deal only through the state highway departments, and second, that the application of the funds will be upon a definite secondary road system."

The $800,000,000 figure was contingent "on the states meeting their Federal aid apportionments.

"As an integral part of the present highway policy, the participation in the improvement of major traffic routes within the cities and the grade crossing elimination projects are rapidly maturing facilities of the utmost value," he said:

Concerning secondary or feeder roads, he said:

"To provide free flow highways leading from the cities into the country, and to permit the distribution of vehicles on these radial highways, from and to their own quadrants in the city over one or more belt line highways, will add immeasurably to the potential utility of the motor vehicle to the urban dweller, and such development will be supported by increased use."

★ Recent improvements at the Mitchell, Ind., plant of the Lehigh Portland Cement Co. now allow the production of masonry cement at the mill in addition to regular Portland cement. Storage capacity was increased to handle stocks of 25,000 bbl. of the new product.

Road Builders Pack Bags for Convention

MEET IN NEW ORLEANS JAN. 11-15

Road builders by the thousands will descend on New Orleans during the second week in January to attend the annual convention of the American Road Builders' Assn. and the equipment exhibit. Dates of the gathering are Jan. 11-15 and convention sessions and the show will be concentrated in the New Orleans municipal auditorium.

The meeting will open Monday afternoon, Jan. 11, with a general open session in Room B. On Tuesday, Jan. 12, road stabilization and safety meetings will be the high spots with county and city officials holding their opening sessions. The Asphalt-paving technologists will meet on Wednesday and Thursday as will the contractors and county and city officials' sections. The National Highway Advisory Council will hold its meeting on Thursday afternoon, Jan. 14. On the final day, Friday, Dec. 15, the only meetings officially scheduled are the business sessions of the A.R.B.A.

Many of the delegates are arranging to accept the invitation of the Mexican government to inspect portions of the Pan-American Highway extending from Mexico City to Laredo, Tex.

While no heavy equipment will be on display this year the exhibit has attracted more interest than in several years past. Booth space has been at a premium and every available location was allotted several weeks ago. A list of exhibitors follows:

Adams Co., J. D.; Air Reduction Sales Co.; Allis Chalmers Mfg. Co.; American Conc. Exp. Joint Co.; American Manganese Steel Co.; Anthony Co.; Armco Culvert Mfrs. Assn.; Asphalt Institute; Athey Truss Wheel Co.; Atlas Powder Co.; Austin Western Road Machinery Co.; Barber-Greene Co.; Barrett Co.; Bendix Products Corp; Bendix-Westinghouse Co.; Black & Decker Mfg. Co.; Blaw Knox Co.; Bucyrus Erie Co.; Buda Co.; Budde Tank Co.

C. H. & E. Mfg. Co.; Calcium Chloride Assn.; Philip Carey Co.; Caterpillar Tractor Co.; Chain Belt Co.; Chevrolet Motor Co.; Cleaver Brooks Co.; Cleveland Tractor Co.; Concrete Surfacing Machinery Co., The; Construction Machinery Co.; Continental Motors Corp.; D-A Lubricant Co.; Deere & Co.; Dow Chemical Co.; Eaton Mfg. Co.; Edison Splitdorf Corp.; Etnyre & Co., E. D.; Euclid Road Machinery Co.; Evans Products Co.; Fairbanks, Morse & Co.; Foote Co., Inc.; Four Wheel Drive Co.; Fruehauf Trailer Co.; Fuller Mfg. Co.

Galion Allsteel Body Co.; Galion Iron Works & Mfg. Co.; General Electric Co.; General Motors Truck & Coach Co.; Godwin Co., Inc., W. S.; Gorman-Rupp Co.; Gruendler Crusher & Pulv. Co.; Harnischfeger Corp.; Heil Co.; Heltzel Steel Form & Iron Co.; Hercules Motors Corp.; Hetherington & Berner, Inc.; Highway Steel Products Co.; Hough Co., Frank G.; Hug Co.; Hughes Keenan Co.; Insley Mfg. Corp.; International Harvester Co.; Iowa Mfg. Co.; Jaeger Machine Co., The; Johns-Manville Co.; Johnson Co., C. S.; Keystone Driller Co.; Kinney Mfg. Co.; Koehring Co.; Koppers Co.

Laclede Steel Co.; La-Plant Choate Mfg. Co.; Leschen & Sons Rope Co., A.; Le Tourneau, Inc., R. G.; Lima Locomotive Works; Link Belt Co.; Littleford Brothers; Lone Star Cement Corp.; Lufkin Rule Co., The; Macwhyte Co.; Mall Tool Co.; Marion Steam Shovel Co.; Master Vibrator Co.; National Paving Brick Assn.; National Traffic Guard Co.; Novo Engine Co.; Osgood Co.; Pioneer Gravel Equipment Mfg. Co.; Portland Cement Assn.

R. B. Equipment Mfg. Co.; Ransome Concrete Mach. Co.; Riddell Corp., W. A.; Scintilla Magneto Co.; St. Paul Hydraulic Hoist Co.; Schramm, Inc.; Servicised Products Corp.; Signal Service Corp.; SKF Industries, Inc.; Smith Co., T. L.; Solvay Sales Corp.; Speeder Machinery Corp.; Sterling Machinery Corp.; Texas Co.; Thew Shovel Co.; Timken Roller Bearing Co.; Toncan Culvert Mfrs. Assn.; Trackson Co.; Truscon Steel Co.; Tuthill Spring Co.; Universal Crusher Co.; Walter Motor Truck Co.; Waukesha Motor Co.; White Mfg. Co.; Wico Electric Co.; Williamsport Wire Rope Co.; Gar Wood Industries; Wood Preserving Corp.; Wright Dalton Machinery Co.

Inland Quarry Forces Given Wage Increase

Employes of the Inland Lime & Stone Co., Manistique, Mich., have been granted wage increases. The lowest rate paid to labor has been advanced to 49 c. per hr. with specific increases above that level, based upon revaluations of the particular classifications involved.

★ John DeMatteo, who recently leased the plant of the New England Crushed Stone Co. at Roslindale, Mass., has purchased a No. 19 Kennedy gearless ball-bearing crusher, furnished by H. R. Jaques Co., Boston, Mass.

Seeks to Aid 31 Men Stricken by Silicosis

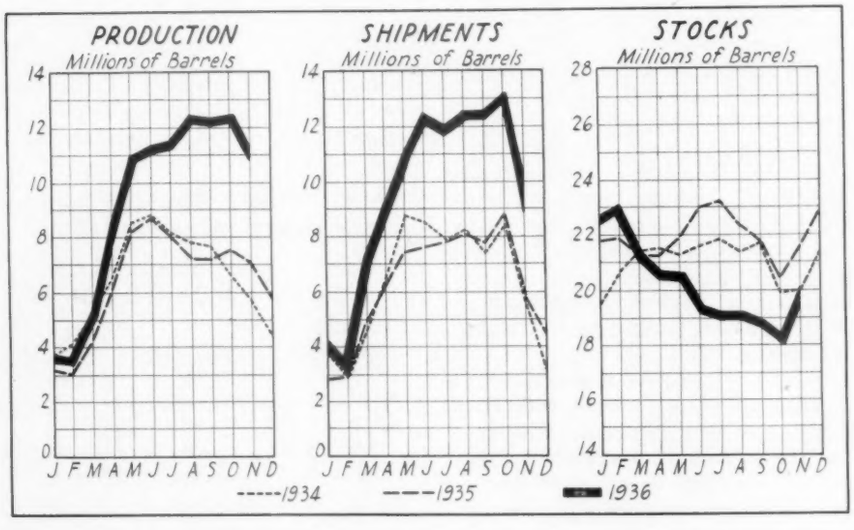
SEC. PERKINS WRITES GOVERNOR

The plight of 31 silicosis-stricken pottery workers of Robinson, Ill., whose spokesman alleged that they were discharged at the instance of an insurance company, was called to the attention of Gov. Henry Horner recently by Secretary of Labor Frances Perkins.

One of the discharged pottery workers wrote the labor secretary that he and his associates were dismissed by W. A. Case & Son, Robinson pottery manufacturers, the day before the occupation disease clause of the Illinois workmen's compensation law became effective.

"It appears that at the instance of the insurance carrier," Miss Perkins wrote, "the employees were given a physical examination and those found to have any indication of silicosis were summarily dismissed despite the fact they had been employed by the pottery concern for 10 to 16 years, and also notwithstanding the fact that the men were able to continue at their work."

★ A Fairbanks conveyor scale, made by Fairbanks, Morse & Co., recently went into service for weighing slurry before going to the kilns at the plant of the Dewey Portland Cement Co., Davenport, Ia. A similar scale will go into service shortly to weigh the coal before it enters the pulverizers.



The Portland-cement industry in November, 1936, produced 10,968,000 bbl., shipped 8,962,000 bbl. from the mills, and had in stock at the end of the month 20,086,000 bbl. Production and shipments of Portland cement in November, 1936, showed increases, respectively, of 54.6 and 50.0 per cent., as compared with November, 1935. Stocks at mills were 7.1 per cent. lower than a year ago. The mills operated at 50.9 per cent. of capacity in November, 1936. In the same month a year ago the ratio was 32.2 per cent.

Cement-Products Men to Gather in Chicago

CONCURRENT MEETINGS JAN. 18-20

A program packed with information on modern construction and merchandising methods has been completed for the first National Conference of Concrete Contractors to be held at the Hotel Sherman in Chicago on January 18, 19 and 20. Nationally recognized leaders in concrete contractor work not only will discuss but will show with demonstrations and motion pictures how modern concrete structures are being built and sold successfully today. From the largest concrete house job to the smallest colored concrete flagstone, every subject will be completely dissected and analyzed.

A session on reinforced-concrete house construction will include discussions on various types of wall construction, forming methods and costs. *How We Built the Purdue Research Foundation House* will be discussed by Robert E. Schwartz, of the Charles Gambsky Co. *Building My Insulated Double Concrete Wall House* will be discussed by Stanley G. Cutler, consulting engineer of Chicago. A motion picture of building a ribbed-concrete-wall house will be shown by A. P. Turner, of the Turner Gravel Co., San Antonio, Tex. Actual working models of forming systems also are planned for demonstration at this meeting.

A forum on residential and industrial floors will feature the latest methods of constructing and finishing concrete floors, with one of the talks to be given by M. E. Feddeler, of the Ce-Mas-Co Floor Co., Chicago, on durable floor finishes for heavy factory trucking.

In a joint session to be held with members of the National Concrete Masonry Assn. holding a convention on the same dates at the Sherman Hotel, Bernard Johnson, editor of *American Builder,* will forecast opportunities in the building field. Following him, W. D. M. Allan, director of promotion, Portland Cement Assn., and J. M. Cleary of the Roche, Williams & Cunnyngham advertising agency, will speak on the part advertising plays in concrete house promotion.

How the newly-developed, smaller concrete pump can be used to distribute concrete on smaller jobs will be explained by G. F. Ball, chief engineer of the Chain Belt Co., Milwaukee. Illustrated by motion pictures of the equipment in operation, this paper promises to be a highlight of the conference.

There will be a trial mix demonstration and a talk on the principles of good concrete making. Proper methods of using colors and the placing of colored concrete will be discussed and demonstrated.

Discussions will be developed on proper cost records, exposed aggregate for driveways, short cuts in precast concrete joist floor construction, and other subjects as time permits. The Portland Cement Assn. will hold open house for the inspection of their research laboratories the last afternoon of the convention.

A feature in connection with the conference will be an extensive exhibit of concrete products and contractor equipment and supplies.

Cement Assn. Adds to House-Promotion Staff

Because of the success already attained in its concrete-house promotional program, the Portland Cement Assn. is preparing an even more intensive campaign during 1937.

Fifteen engineers have been employed by the association for specialized work in this field. Before launching their work at various district offices, these men spent most of the months of November and December at the general headquarters of the association at Chicago where they studied as a class under the direction of Paul M. Woodworth, research and concrete specialist. The men and the offices to which they will be attached are as follows:

CHICAGO: C. A. Juntensen; J. A. Ogden; B. D. Keatts; F. R. McComb
ATLANTA: J. B. Shand and T. L. Gash
AUSTIN: P. D. Barnard
PHILADELPHIA: C. C. Singleton
KANSAS CITY: S. C. Coats
NEW YORK: A. R. Hahn; E. K. Smith; J. P. Whelan.
ST. LOUIS: S. M. Burke
RICHMOND: V. B. Grow, Jr.
WASHINGTON: Norman Hansen

Kelley Island Crushed Stone Shipments Higher

One hundred and forty-nine boat loads of crushed stone were shipped from the Rockport, Mich., plant of the Kelley Island Lime & Transport Co. when the season closed on Nov. 30, an increase of 25 per cent. over 1935, according to B. C. Gardner, superintendent. The average cargo was about 5,000 tons, making total shipments for the season of approximately three-quarters of a million tons.

★ The Giant Portland Cement Co. has ordered a 16-ft. Bradley air-separator for installation in its Egypt, Pa., plant and has provided for a second unit of similar design to be placed in service later.

34th Annual Meeting of PCA Is Concluded

MEHREN RE-ELECTED PRESIDENT

More roads and wider roads of permanent construction were advocated by those attending the 34th annual meeting of the Portland Cement Assn., at the Blackstone Hotel, Chicago, Dec. 14 to 17 as necessary in a broad program of safety on the highways.

The gathering attracted a large and representative gathering of the leading producers of Portland cement as well as makers of equipment used in the industry. Edward J. Mehren was re-elected president; Charles L. Hogan, head of the Lone Star Cement Corp., New York, N. Y., was named chairman of the board of directors; S. W. Storey, president of the Consolidated Cement Corp., Chicago, Ill., was elected treasurer; Frank L. Page, asst. treasurer; and W. M. Kinney was again chosen as general manager and secretary.

One of the highlights of the convention was a dinner on the evening of Wednesday, Dec. 16, in honor of B. F. Affleck, who recently retired as president of the Universal Atlas Cement Co. Mr. Affleck was made an honorary life member of the association.

During the sessions, F. R. McMillan, director of research, and A. J. Boase, manager of the structural and technical bureau told of their observations on a recent tour of Europe. W. G. Kaiser of the association staff reviewed progress in concrete-house promotion, and A. J. R. Curtis, asst. to general manager, reported on the occupational-disease situation.

The Job Ahead in Pavement Promotion was the subject of an address by W. M. Kinney, general manager, and D. S. MacBride of the Lone Star Cement Corp., told of future advertising and publicity plans of the association.

Lime Maker Distributes Bonuses to Employees

A Christmas bonus of $5,000 was distributed among more than a hundred employees of the M. J. Grove Lime Co. by William J. Grove, president, early last month. The distribution was the first in the company's history. The Grove company operates three plants at Brookeville, Md., Frederick, Md., and Stephens City, Va.

★ The Petoskey Portland Cement Co., Petoskey, Mich., recently purchased a Schaffer Poidometer for installation in its plant.

Editorials

Let's Face the Music—and Act!

THE last few years have startled many complacent minds with the shock of new developments, things that were not new in conception but new only in the sense of their having been attained. The conditioning circumstances and environment necessary for their completion were obvious for years, they were openly and repeatedly discussed in circles whose interests were somewhat more public-spirited in character than those of industry, and they pointed unmistakably to the results that have proved to be so appalling. The increasingly-strict regulation of business by government, the attacks on the profit motive made and still being made by organized consumers and other pressure groups, the rapidly-growing strength and self-assertiveness of labor, the threats of socialism, communism, fascism, anarchism, syndicalism, and the other "isms" yet to be born—these are some of the things which, while of early origin and slow growth, are not seen by many of us until they have reached the zenith or near-zenith of their power. Our "hardheadness"—a quality which one psychologist has defined as our "impermeability to reasoned persuasion and responsiveness to shock-terror"—makes us dismiss these ideas and movements as "theories" while they are still young, weak and capable of being shaped; our having ignored them in their formative stages makes us unequal to the task of meeting them on even reasonably equal terms when they are full-grown and strong.

It is the intellectual preparedness necessary to a proper understanding of these problems and to an adequate dealing with them which we have tried to encourage on the part of our readers whenever we may have seemed to stray from the restricted field of questions peculiar to our industries to discuss matters of broader application and greater importance. As long as individual success in business continues to call for the high degree of concentration, intellectual isolation and localized preoccupation on the part of its devotees that has been necessary for its attainment, just so long will it be necessary to try to arouse in business men a desire to understand the currents of modern thought in those social groups that are not greatly interested in preserving the profit motive in industry, and which may, in the long run (and, possibly, even in a relatively few years), greatly impair its security or destroy it. Labor is one of those social groups, and its objectives, its methods and its attitude toward the profit motive must be understood by business men, if they are genuinely desirous of maintaining that form of economic incentive as an important motivating force in industry.

Much of what we have at different times said, and much of what we shall say here, on the subject of labor will be recognized as elementary by those who have studied the "labor problem." At the risk of tiring those business men who have made such a study and do understand it—not a great risk, since such an understanding is not common among business men—it may be worth while to say something fundamental about a politico-economic relationship—that between employer and employee—which is one of the most important in modern industrialized society. This relationship is being strained as it has, perhaps, not been strained before, because the importance of the basic issues is greater than it has ever been and the opportunities for adjustment, whether through conflict or conciliation, seem to be somewhat less promising than in former years.

THE very existence of a "labor problem" is due to fundamental differences between the interests of the employer and those of the employee. The employer in any enterprise operated for profit seeks the maximum return on each of his various forms of investment—his materials, his plant (land, buildings and machinery), and his labor (managerial, clerical, selling, and productive.) His objectives are the attainment of the maximum spread between the total costs of these investments—initial, operating, maintaining and replacing costs combined—and the gross return for the product sold, and the preservation of this spread at a fairly uniform or, preferably, a rising rate and for as long a period of time as possible. To accomplish these ends he must always strive to "buy cheap and sell dear." In his relations with labor he will naturally try to work his men as many hours in the day as possible on the theory that their productivity varies in approximately a direct ratio to the number of time units during which they are employed; he will try to make them work as rapidly as possible in order to increase the number of output units in proportion to the number of time units of employment; he will try to hire them at as low a time- or product-unit cost as possible; and he will endeavor to employ them no longer than is necessary for the production of a given output. These principles, which are thoroughly businesslike in the strictest sense and are not qualified by any considerations other than those of expediency and result-justification, are applied without favoritism to each of his other types of investment—materials and plant—as well as to labor. The end sought in every case is the greatest return for the least outgo, and the question is not one of morals but of efficiency for profit realization. As these objectives and the methods for attaining them are thoroughly

understood by business men, being the very foundation stones on which the profit edifice is erected, there is no need to enlarge upon them here. As much can not be said, however, about the objectives and methods of labor. If these were as well understood by business men as the latter's objectives are understood by labor, we might add, employer-employee relationships would be less a problem than they are.

The seriousness of this problem has increased rather than decreased through the years, because the gulf between the employer and the employee, considered as persons and not as economic entities, has widened in the last half-century or more. In that period the personal employer, the human employer, who was the manager as well as the owner of his business, has almost disappeared in the field of large enterprise, and his place has been taken by the impersonal, not-human corporation, whose management is entrusted to other employees, who may or may not be stockholders and who do not, except in unusual cases, own controlling or otherwise large interests in the business. The major parties in interest—the employer (or the man with the most to gain), and the employee (or the man with the least to gain)—are now separated by a salaried intermediary, whose chief interests are his own and are only temporarily concerned with theirs. The old personal relationship has given way under the pressure of rapidly-spreading absentee ownership to a representative relationship, which is of uncertain duration and therefore lacking in that sustained good-will which was such an important factor in the dealings between employers and employees in former days. Labor troubles, as measured by strikes and lockouts, have become more numerous and more serious in their social and economic effects since this transition in employer-employee relationships became general. The personnel director, the department head, the superintendent and the foreman are not adequate substitutes for the old owner-employer. No method for instilling in them the good-will-building ambition of the old-time employer has been devised; nothing has yet been contrived to give them the sense of responsibility that comes from ownership.

MODERN corporation management, except in rare instances, does not approach the labor problem with the owner-employer attitude. This has forced labor to rely more and more upon collective, outside-directed action for the protection of what it conceives to be its interests, and as this dependence has increased, the seriousness of the labor problem, as seen from the employer's point of view, has grown greatly. Unfortunately, his means for dealing with it seem to be no better.

One of labor's chief objectives is continuity of employment on a basis of remuneration that will leave something above the actual cost of living. If labor can not have continuity of employment, then it must receive compensation on a sufficiently-high time- or product-unit basis to support it and its dependents during periods of enforced idleness as well as employment. That is elementary from the standpoint of the economist and ought to be plain to the employer. The human body is not like the other forms of investment in which the employer places his surplus funds. It requires constant refueling on the basis of a definite minimum for existence, which must continue irrespective of employment and unemployment. It can not, like a machine, be stopped and allowed to remain idle either for lack of work or in readiness to perform "stand-by" service in the expectation that the cost of operating it and maintaining it can also be stopped. Its life is a process of continuous destruction and reconstruction of cellular structure and the rate at which this goes on is only slightly affected by the variations in energy expenditure caused by productive employment and unemployment. This continuing need for sustenance, for housing, for clothing and for the maintenance of health is the basis for labor's demand for either continuity of employment at reasonable wage levels or its annual-income equivalent in the form of seemingly-excessive time- or product-unit rates of pay. It is the basis for labor's claim for higher overtime rates, for a full day's pay for a few hours' work, and for high unit wages in seasonal occupations.

ECONOMISTS have no quarrel with these contentions. They recognize all these claims as proper, as production burdens which should be borne, together with the costs of occupational accidents, diseases, health, unemployment and old-age disability, by the industries in which they occur. They are, economically speaking, legitimate factors in calculating the cost of producing any given product. They can not, in any sound economic structure, be evaded or passed on to other industries, and this evasion or diversion economists hold largely responsible for some of the major economic maladjustments from which business and society suffer.

Labor asks, of course, for recognition of its organizations and for exclusions of nonunion or anti-union workers, for collective bargaining and the closed shop. These have been part of labor's claims for years, for it was early seen that acting individually, each motivated by what he took to be his own interests, workers could not attain any of the objectives which they all sought—better wages, steadier employment, better working conditions—and that only or principally through the closed-shop agreement, made and enforced collectively, could non-coöperating workers be brought within the ranks of union membership. Employers from the beginning rightly understood that recognition of the asserted right to bargain collectively weakened their own position while it strengthened that of labor and their opposition is, naturally, still vigorous. By collective bargaining workers greatly reduced the chances of employers "playing" individual employees against each other, since by concerted effort individual bargaining (which usually meant individual concessions on the part of each employee) was made more difficult of accomplishment on a scale sufficiently great to defeat organized labor's programs. Trade-union members looked upon non-members as enemies, determined to further their individual momentary in-

terests regardless of the effect on the interests of the laboring class as a whole. This attitude supplied the moral justification for demanding the closed shop, for picketing, for intimidation, and for violence. The philosophy which condoned the most extreme of these methods did not gain much sympathy outside trade-union ranks, except in less patient groups, where communism, syndicalism and anarchism seemed to offer the way to quicker and more direct action. These smaller and less conservative movements did not do so much to create discontent as they did to organize and trade upon it; they found widespread dissatisfaction and provided the vehicle through which it could make itself felt.

The craft type of labor union, the true trade-union, was a natural development of the old guild idea, in pursuance of which workers at a given craft or trade organized for the protection of their own interests. They regulated the qualifications and terms of apprenticeship, seeking thereby to prevent unemployment by limiting the number of entrants into the practice of the craft. This type of organization was effective in industries in which skilled labor predominated, or, more correctly, in trades which had not been mechanized, and is still looked upon by labor as the most useful type in those fields. Intercraft disputes arising from overlapping duties and questions of jurisdiction embarrassed and weakened some of the craft organizations, but this form of union is still powerful and effective in the building trades and other hand crafts. The craft, or horizontal, type of union was the scheme on which the American Federation of Labor was erected, although this group contains some unions organized on the industrial, or vertical, plan.

IN mass-production industries, wherein the use of mechanized methods of production is highly developed as in the motor-vehicle field, the craft type of union has lacked the cohesiveness thought necessary to operate effectively in the workers' interests, and to meet this deficiency the industrial type, in which an attempt is made to organize all the workers in a given industry irrespective of the nature of their tasks, was devised. The Committee for Industrial Organization, promoted by John L. Lewis, head of the United Mine Workers of America which is the country's outstanding industrial union, is seeking the organization of every key industry on the industrial-union basis. The United Automobile Workers, which has just brought the motor-vehicle industry virtually to a stand-still, is a union of the industrial or vertical variety. The advantages to labor of this type of organization are its ability to stop production in an entire industry, whereas the craft type can control only the craft affected—unless it can win the sympathy of related crafts in sufficient number to halt all productive operations—and then often only in a single plant or in a small area. Labor considers the industrial union the most effective tool for attaining its objectives, since it does not depend on the coöperation of related but not unified bodies for successful operation, but eliminates intercraft rivalry by placing all skilled workers as well as the unskilled under a single directing head. It gives to labor a centralized control and a unanimity of purpose and direction that is not possessed in anything like the same degree by even a closely-knit employers' association. It is unquestionably a vital stepping-stone toward the unification and unionization of all labor.

ORGANIZED labor has almost always possessed a striking advantage over employing groups in negotiating contract terms, in planning strikes, and in opposing lockouts. Except for craft rivalries, which were often fostered for ends not related to the interests of labor, powerful labor organizations have had a unity of purpose and a singleness of objective and method that are not easily attained by employers. All labor-union members consider themselves parts of a class, of whose duties, rights, power and opportunities they are fully conscious, and even among non-members there is a widespread sense of class solidarity although not expressed by open affiliation with existing organizations. While they may consider themselves competitors when they apply for individual jobs, their organization membership minimizes this feeling by submerging it in the larger interests of the class to which they belong. No such commonness of purpose exists among employers, except, and then not always, at crucial times, when a strike of great extent is threatened. The cost of labor is often a considerable part of the final cost of the product and is even more often, perhaps, the channel through which price cuts are made possible through reducing wages, so that employers are generally inclined to "fight it out alone," leaving their competitors to effect their own settlements of labor disputes in their own ways. This individualism is often carried to such extremes that an employer will bribe a union official to terminate a strike in his own plant in order to obtain an advantage, at most only temporary, over some competitor whose plant is strike-bound. Such "strokes of genius" almost always result in a chain of bribery and corruption which not only deplete the employer's resources for surviving a period of inactivity but strengthen the tactical and moral position of the official who is willing to "coöperate." This type of dishonesty on the part of union officials is not possible without the connivance of advantage-seeking employers.

The same rivalry that makes coöperative action by employers so difficult to initiate and maintain manifests itself in the negotiation of separate agreements with trade unions. Many employers have signed, under the pressure of strike threats, contracts covering wages, hours, working conditions, union recognition, check-offs, the use of nonunion-made materials, and the like, by the terms of which they have not only bound themselves and restricted their field of endeavor but have established a precedent that becomes, for a time at least and until a better bargain can be made, the standard for an entire industry. The most harassing kind of attack, and the one which is most effective in dealing with those whose selfish interests divide them and prevent united action, is the one which singles out the weakest opponents and strikes them down

one at a time, using each successive victory as a weapon for exacting a more humiliating concession from the next victim.

That is good strategy and is the type of tactics that has won for labor many of the gains it has made. It is not likely to be abandoned as long as it is effective, but in anticipation of the time when its efficiency may be somewhat worn by use or weakened by superior counter-strategy labor has already worked out pratical organizations of the industrial type which will make the slow method of attacking individual employers unnecessary. The rapidity with which industrially-organized labor power can be made effective has already been sufficiently well shown to leave no doubts that it is the most easily applied and most all-embracing means for attaining its goal that labor has yet grasped. Its use has made the winning of public support a matter of small interest to the laboring class, which has always been somewhat unmindful of public opinion and heedless of the effects of its actions on the general public.

The employer who believes that labor-union members are a misguided lot, the victims of exploiting officials, and intent on the overthrow of existing institutions displays very glaringly his need for studying the aims and methods of organized labor. He may read the newspapers closely, he may scan the pages of his favorite tabloids regularly, he may discuss labor disputes (usually his own) with his friends on the golf course, he may read the consoling articles in the "stand-pat" weeklies, he may attend round-table discussions of labor relations at his club—he may do all these things, and he may have done them for years, and still be out of touch with what is transpiring in the world of labor.

LABOR really is a world of its own, with its own thinking (and plenty of it), its own language, its own aspirations, its own problems, and its own methods. It has its own educational institutions and publications, it has competent intellectual leadership in the fields of economics, political science, sociology, philosophy, statistics and technology, and its negotiators possess a knowledge of industrial conditions and of the situation in individual plants, with respect to methods, supposedly secret processes, wages, hours, output, prices and profits, that often surpasses that of the men who own and operate them. What is more, there is outside this world of labor an unmistakable trend of thought in the direction of a better understanding of social problems and a growing demand for a more intelligent approach to possible solutions of this important one of labor relations. A larger share of the general public, which bears much of the burden of industrial strife, is determined that its interests in the amicable adjustment of employer-employee relationships shall be safeguarded and, in the absence of better or more promising instrumentalities of relief, is turning to governmental interference as a way out. No one will ever know how much of the public's voice in 1932 and 1936 was contributed by labor, by labor's friends and dependents, and by thoughtful people in other walks of life, but we suspect that the contribution was considerable. Those are developments of which it is too easy to remain in ignorance; they are developments of which no business man can afford to remain unaware.

WE live in a dynamic age, an era of dynamos and dynamite. Things move forward in spite of every effort to hold them back; the spirit of progress is relentless even though at times uncertain. The relations between employers and employees, the "labor problem" in short, is one of these things that can not be settled by strife, indifference or avoidance. Something will be done about it—in fact, much is being done about it—but the doing is not in the hands of those whom employers would elect to have perform the task and the doing is not to their liking. But, has business any candidates to offer? Will it present anyone, or any group of men, who will rise and say that they have made a study of this problem; that they understand the aspirations of labor; that they are willing to coöperate with representatives of labor, of consumers, of other business men, of government; that they sincerely desire an adjustment of conflicting interests, rights and responsibilities based on a recognition of the principle of justice applied to all; that they see the futility, the absurdity, the costliness and the interminability of interclass strife; that they naturally want to conserve their own interests but are nevertheless not unmindful of the public's interest?

Some business men are terror-stricken by the threats this problem presents to industry, and their reactions are those of the emotionally unstable. "Deportation," "fascism," "nationwide lockouts," "martial law" are some of the words that rush to their lips after the first moment of incoherence has passed. But it will be none of these, because none of these are aimed at anything deeper than symptoms. Such treatment would be superficial, indeed, and would expose in a most distressing manner our inability to diagnose the ailment that afflicts us. Have we not already shown enough lack of understanding?

The fact that this is the first time that our editorial comment has extended to this length should be sufficient evidence that we consider labor relations a question of exceptional importance. We could not very well overstate our conviction that it is a problem of transcending importance. We say, too, that we know of no cure-all; we expect no ready or rapid solution. But we do believe, and we say this with all the earnestness of which we are capable, that this problem must be thought out rather than fought out, that it must no longer be side-stepped, that we can no longer remain indifferent to the possibilities involved in it, that it must be studied with intelligence and integrity, sincerity and perseverance. This is a task for business men of all kinds, for manufacturers, merchants, providers of public service, for every individual who takes, and believes in his right to take, a profit for the service he performs. It is as worthy an undertaking for those who remain behind the scenes as for those who may be chosen for active participation in the cause of better industrial relations. And, since it must be done, let's face the music—and act.

OPTIMISM REIGNS AT N. S. & G. ASSN.

THE significance of the Social Security Act, the applicability of the Robinson-Patman and Walsh-Healy acts, and the importance of occupational diseases, such as silicosis, won a large share of the attention and interest of the producers who attended the twenty-first annual convention of the National Sand & Gravel Assn. in Memphis last month. This was the first separate convention and show of the gravel industry since the dissolution of the Mineral Aggregates Institute in March, 1936, and marked a departure from prior practice in that it was held more than a month earlier than in former years. This change was decided upon in the hope that it would encourage attendance by avoiding the rigors of January weather. The convention sessions opened on Tuesday morning, December 8, following the directors' meeting which began on Monday and was continued on the following day.

President Foster presided at the opening session which was devoted to discussions of road building—the continuing need for roads as seen by a representative of highway users, and the rapid strides made by Mississippi in building better roads.

Answering in the negative the question, *Are We Through Building Highways?*, Major Roy F Britton, director of the National Highway Users' Conference, told of the increasing need for better roads. He gave an interesting account of early road building in this country, tracing its history back to pre-railroad days. Between 1808 and 1836, he pointed out, the Federal government spent nearly $7,000,000 to build the "Old National Road," which extended from the Atlantic Ocean to the valley of the Ohio River and was later paralleled by the Baltimore & Ohio railroad in the East and by the Pennsylvania in the West. More than thirty other roads were similarly used as guide lines for subsequent railroad development. "The 'Old National Road' was not constructed or used alone for private purposes," Interstate Commerce Commissioner W. E. Lee said recently. "In the 'horse-and-buggy' days that old pike bore much of the commerce of the country. In that old day it bore the stage coach, the covered wagon and the 6-mule team."

The shifting of interest in road building from the Federal government to the states did not occur until, as Major Britton expressed it, "long-distance hauling became unprofitable because of the railroads."

The motor vehicle has helped the railroad industry, in Major Britton's opinion. "The manufacture and use of motor vehicles to-day furnishes more than 15 per cent. of railroad freight traffic" . . . and "the railroads receive more for transporting gasoline than they receive for the transportation of all the wheat, corn, oats, cotton and tobacco grown in the United States."

There are certain types of freight business which the railroads can never recover, the speaker said, and "fair competition, good service, and reasonable rates will be the tests" as to the remainder. He quoted the Joint Committee of Railroads and Highway Users as having said that: "The public is entitled to the most economical and efficient means of transportation by any instrumentalities of transportation which may be suited to such purpose, and no legislation should be enacted which has for its purpose the stifling of any legitimate form of transportation. The supreme test must always be the interest of the public. The public's right to the selection of the agency of transportation which it wants and which it finds most useful must be respected." The speaker pointed out the fact that there are "48,000 communities in the United States which have no railroad service and whose only means of land transportation is the automobile, the truck and the 'bus."

To the charge, widely circulated by the railroads, that motor transportation is subsidized he replied that a "subsidy" is a government grant to a private enterprise, whereas highway building and highway transportation are not private enterprises. The highway "belongs to all the people as contrasted with other facilities of transportation which are privately owned," said the speaker. "Certainly the building of roads for the use of all the people for all purposes can not be regarded as a subsidy such as the generous donation of lands, cash and bonds by the Federal, state and local governments to the railroads in their early days," he added.

Motor transportation brought a demand for better highways and from this evolved the idea of special taxes on motor-vehicle owners for their construction and maintenance. Over $11,000,000,000 has been collected in special highway taxes since the first motor-vehicle registration fees were imposed in New York in 1901 and since the first gasoline tax was made effective in Oregon in 1919. As a result there are now 500,000 mi. of roads and streets under state control and of this mileage nearly 400,000 is surfaced. There are about 1,000,000 mi. of surfaced roads in the country, the speaker estimated, and about twice as much yet to be improved.

The benefits of good roads are widely spread, Major Britton declared, and no one can say who the sole or chief beneficiaries are and who should pay for their construction and maintenance. On this subject he quoted the Brookings Institution as having said: "Looking forward it is reasonable to assume that for the country as a whole, if not for all states, contributions from highway users will be sufficient to cover the full cost of state and county highways and an increasing portion of town roads. We conclude, therefore, that on the whole highway users are now paying for those highways which are of general use. Local highways are still being paid for, in the main, by local beneficiaries."

On the subject of the diversion of highway revenues to other than highway purposes the speaker said that a practice which began about ten years ago, when $11,000,000 was diverted by a few states, had grown to the point where 35 states are misapplying more than $150,000,000 yearly. He stated that while motor-vehicle taxes are a fair measure of a motor vehicle owner's contribution to highway building and maintenance they are "not a fair measure of taxation for the support of the government, education, relief, social security, or other purposes not directly related to highways," as their appropriation for these other uses would imply. In four states—Missouri, Minnesota, Kansas and Colorado—the constitutions have been amended to prevent diversion and in September the people of Maine voted in favor of a law that has the same effect.

On the need for further highway im-

CONVENTION

NATIONAL SAND AND GRAVEL ASSOCIATION

1937

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provement Major Britton quoted the committee on Post Offices and Post Roads of the United States Senate as having said two years ago:

"There will always be a legitimate demand for new construction on the American road system. Highway construction is a dynamic and continuing responsibility. Highways grow either worse or better. They can not stand still with 25,000,000 vehicles in daily operation. At present the greatest need in a majority of the states is the completion of through routes. In some states the pressing problem is the widening and straightening of truck-line highways between large centers of population. With over 30,000 deaths and 750,000 injuries each year from automobile accidents the elimination of traffic hazards must receive not only continuous but better attention."

E. D. Kenna, director of the Mississippi State Highway Commission, told of his state's *Planning and Executing a Well-Balanced Highway Program*. In 1930 his department was reorganized and a 6,000-mi. highway system begun. It was composed largely of gravel and dirt roads. The state's gasoline tax is now 6 c. a gal., of which 2½ c. goes to the counties to pay road bonds principal and interest. A little more than $1,000,000 is spent annually to maintain those 6,000 mi. of roads and bridges and for new construction.

In 1931 the state received $1,500,000 from the Federal government, and from the original P.W.A. allotment of $400,000,000 for roads a total of $7,000,000. In 1933 only $10,000,000 was available.

Many roads have been relocated to eliminate dangerous turns and grade crossings. On 15 projects which formerly measured 127 mi. relocation reduced this mileage to 82 and lowered the number of grade crossings from 19 to 3. On some other relocation projects the combined mileage was reduced from 544 to 422 and the number of grade crossings from 64 to 14.

Mississippi's new governor and legislature made $42,500,000 available for state road building by obtaining $15,000,000 from the P.W.A., by matching $4,500,000 of Federal aid and by a self-imposed levy of $18,500,000 with no increase in taxes. This $42,500,000 total is being spent on 2,700 mi. of priority highways, of which 1,000 mi. is already paved. When the program is finished there will be 2,000 mi. of first-class roads and a $23,000,000 debt.

In a brief talk on the *Program of Association Activities in 1937* Robert J. Potts, president, Potts-Moore Gravel Co., Waco, Tex., called attention to the fact that the problems which were considered important when the association was formed 21 yr. ago have dwindled into insignificance compared with the problems now facing the industry. The economic, social and political situation is more complicated than it ever was and the need for a trade association correspondingly greater, in his opinion. He believes that perhaps no other industry has more points of conflicting interests with outside forces than the sand-and-gravel industry. He reported the adoption by the board of directors of a budget which will allow the carrying-on of the association's present scale of activities.

Those present at the Tuesday afternoon session, presided over by Paul P. Bird, president, Boston Sand & Gravel Co., Boston, Mass., considered the report of the Committee on Revision of the Constitution of the association, of which Alexander W. Dann, president, Keystone Sand & Supply Co., Pittsburgh, was chairman. The committee's proposals were approved except that the old plan of selecting board members by districts (rather than by states) was adopted and the number of directors-at-large was raised from three to five.

In the *Revival of Private Construction and Prospects for 1937* Thomas S. Holden, vice-president, F. W. Dodge Corp., and president, New York Building Congress, told the assembled producers many things they had been waiting years to hear. He first traced the progress of the construction industry from the depth of the depression in 1933 to the year 1936, which had seen a dollar volume of public work 95 per cent. greater and a volume of private work 135 per cent. greater than the depression "lows" of 1933. In 1936, also for the first time in years, private work

Analysis of Attendance at the Twenty-first Annual Convention of the National Sand & Gravel Assn. Memphis, Dec. 7-10, 1936

Producing companies' representatives	116
(Companies represented)	(68)
Association employees	5
(Associations represented)	(3)
Equipment-Manufacturing Companies' representatives	113
(Companies represented)	(48)
Trade-publications' representatives	8
(Trade publications represented)	(3)
Guests (including 16 ladies)	47

Large Groups in Attendance

Producers:

Greenville Sand & Gravel Co	7
Central Sand & Gravel Co	6
De Laney Gravel Co	5
Gifford-Hill & Co	4

(Six companies had 3 each, 18 had 2 each, and 40 had 1 each.)

Equipment Makers and Publications:

Chain-Belt Co	7
Allis-Chalmers Mfg. Co	5
Lima Locomotive Works	5
Morris Machine Works	5
Bucyrus-Erie Co	4
Fairbanks Morse & Co	4
Pit & Quarry Publications	4

(Twelve had 3 each, 19 had 2 each, and 12 had 1 each.)

represented a full half of the country's total dollar volume of construction.

Mr. Holden stated that we are now in the third great expansion era of this nation. The first, lasting from the adoption of the Constitution to the Civil War period, he called the era of colonization. The second era, that of industrialization, lasted from the Civil War to the World War and the post-war "boom." According to Mr. Holden we are now entering a new era of expansion whose objective is civilization. Social, cultural, educational and recreational development and modern comforts and conveniences will be made available to the many.

The potential demand for housing has been variously estimated at from 500,000 to 1,000,000 new family units annually for the next ten years, but, according to Mr. Holden, it is questionable if this large volume can be obtained under our old system of speculative production and financing of home building. What is needed, he said, is "lower home-mortgage interest rates, production on the basis of the planned community by large, well-financed home-building companies like those which have been so successful in England during the past five years, and a much greater amount of investment housing than we ever had before. Mr. Holden also predicted that in 1937 there would be an increase in public-utility facilities and that the government would continue its rural electrification program with the coöperation of private utility companies.

Mr. Holden cited the modern highway as an important factor in bringing modern comforts and facilities to outlying communities and predicted another good year in 1937. Factory building, he said, is also increasing and there is a marked trend toward decentralization by industry. The future of the construction industry is encouraging, said Mr. Holden, but may suffer setbacks if material prices move up too fast or if wage disputes prevail. A substantial increase in total construction volume for 1937 can be expected in spite of some decrease in government expenditures.

The *Open Forum on Business Conditions* brought forth some interesting facts, which were later summarized by Stanton Walker, the association's engineering director. He showed that in 1936 the volume of sand-and-gravel business was about 32½ per cent. above that of 1935, that prices were practically unchanged, and that the volume was about half the industry's capacity. In metropolitan areas about 40 per cent. of the material produced was used for highways and about 45 per cent. for building construction. In non-metropolitan areas highways took about 70 per cent. of the output. The indications for 1937 point to a slight increase in volume and no changes in prices. Government competition with private industry has been negligible.

Alexander Foster, Jr., vice-president, Warner Co., Philadelphia, reported for his territory that 1936 production had reached 1,700,000 tons as compared with 1,400,000 tons in 1935. Prices were slightly lower in 1936 due to the breakdown of the code and the building of some new plants. Production equalled from 30 to 75 per cent. of plant capacity. Fifty-five per cent. of the output was used for roads and the remainder for building construction. Gasoline-tax diversion, which amounted to $4,500,000 in 1935, fell to $3,000,000 in 1936.

In the New York Metropolitan area, according to Anderson Dana, president, Seaboard Sand & Gravel Corp., New York, the 1936 output totalled 4,500,000 cu.yd., that of 1935, 3,400,000 cu.yd. The average price of 94c. per cu.yd. in 1935 fell to 80c. in 1936. About half of the industry's production capacity was utilized. In 1936 20 per cent. of the output was used for roads, 30 per cent. for building construction and the remainder for ballast and other purposes. The output in 1937 is expected to rise from 50 to 60 per cent., to, say, 7,000,000 cu.yd., with 25 per cent. going into roads and 40 per cent. into building. In four years $200,000,000 in gasoline taxes has been diverted to other-than-highway uses; in 1935 the amount was $58,000,000, or about one-third of the total for the United States.

Reporting on conditions in Louisiana and Texas, P. W. Gifford, president, Gifford-Hill & Co., Inc., Dallas, Tex., said that sand-and-gravel production rose from 10 to 14 per cent. in 1936 and that prices were slightly higher. The industry operated at about 35 to 40 per cent. of its capacity. Of the 1936 output 70 per cent. went into roads, 15 per cent. into buildings, 5 per cent. for ballast, and the remainder for other uses. The output in 1937 is expected to decline perhaps 10 per cent. Gasoline-tax diversion amounts to about $8,000,000 yearly in Texas; there is no diversion in Louisiana. There is not much government production except for a few P.W.A. portable plants. Mr. Dana believes that permanent-plant owners must add portable plants to meet that form of competition.

Charles M. Cadman, president, Pacific Coast Aggregates, Inc., San Francisco, reported for northern California. Last year's output was 60 per cent. above that of 1935, but prices were about 8½ per cent. lower. Not more than 32 per cent. of the industry's capacity was used. Of the 1936 output 44½ per cent. was sold for road work, 38 per cent. for building, 13 per cent. for ballast, and the rest for other uses. This year's output is expected to be larger and prices lower. There has been some borrowing of gasoline-tax funds ($8,500,000) but this will be repaid. Government divisions have set up their own plants and many cities and most counties are producing their own materials. Portable plants are of-

fering serious competition and their use will increase. Established producers have not turned to portable plants except in a few cases.

From southern California H. F. G. Pelsue, comptroller, Graham Bros., Inc., Los Angeles, brought the news that the 1935 output of 3,500,000 tons of sand and gravel and crushed stone was exceeded in 1936 by an output of 6,000,000 tons. The average price was 30c. in 1935 and about 25 per cent. lower in 1936. Forty per cent. of the output was used for roads, 51 per cent. for building, 2 per cent. for ballast and the remainder for other uses. The output is expected to go down a little and prices up in 1937. Portable plants have presented no problem except on the Colorado River Aqueduct work.

A 35-per cent. increase in business in 1936 featured the situation in Michigan, according to Henry N. Battjes, president, Grand Rapids Gravel Co., Grand Rapids. There was no material change in prices. Operations were conducted on the basis of 50 to 60 per cent. of production capacity. Highways took half the total output, building 32 per cent., ballast 9 per cent. and other uses the remainder. This year the output may rise about 10 per cent. with no change in prices. Nearly all the counties in the state produce some unwashed material. Half of the state's total output is produced by portable plants, none of which are operated by established producers.

The report of George W. Renwick, vice-president, Chicago Gravel Co., Chicago, was read by Mr. Ahearn. The output of the area covered by the report —the northern half of Illinois and northwestern Indiana—was 25 per cent. greater in 1936 than in 1935. Prices were somewhat lower due to the demand for lower-class material. About half of the industry's capacity was utilized. This year's business is expected to be better and prices about the same. Last year 65 per cent. of the output was used for roads, 15 per cent. for building, 15 per cent. for ballast and the remainder for other purposes. Gasoline-tax funds have been diverted to the extent of $6,000,000 annually. Portable plants offer serious competition, producing in some localities half of the total output.

Business in western New York from Syracuse to Buffalo rose from 25 to 60 per cent. in 1936, according to H. N. Snyder, secretary, Buffalo Slag Co., Buffalo. Prices remained about the same. The industry operated at about 50 per cent. of its capacity. In 1936 highways took 60 per cent. of the total output and building construction the remainder. In 1937 the output will probably be larger in the cities and prices slightly higher. Of $104,000,000 collected in motor-vehicle and gasoline taxes in 1936 only $15,000,000 was spent on roads.

John Prince, president, Stewart Sand & Material Co., Kansas City, Mo., speaking of conditions in Missouri, Kansas and Oklahoma, said that 1936 business was up fully 20 per cent. above the 1935 level and that prices were about the same. The industry operated at 40 per cent. of its capacity. This year's output should be 10 to 15 per cent. higher. By reason of a constitutional amendment in each state there has been no diversion of motor-vehicle taxes in Missouri or Kansas, but in Oklahoma from 40 to 50 per cent. of the receipts has been spent for other-than-highway purposes.

For western Tennessee, eastern Arkansas and Mississippi Lee T. McCourt, general manager, Greenville Sand & Gravel Co., Memphis, reported a 65-per cent. rise in output in 1936. Prices remained stationary except in Memphis and Mississippi, where they rose slightly. Half of the industry's capacity was utilized. Ninety per cent. of the material produced went into roads and only 8 per cent. into building. This year's business should be greater, in his opinion, with no change in prices. Government competition from P.W.A. and W.P.A. pits has been serious. There is only one portable plant operated by a permanent-plant owner.

Mr. Ahearn read the report of George E. Sutherland, president, West Virginia Sand & Gravel Co., Charleston, W. Va., on conditions in his state. Last year's output was higher due to work on the Tygart Dam, and prices were unchanged. The industry operated at near its capacity. Neither government-owned nor privately-owned portable-plant competition was a serious factor.

W. Jess Brown, vice-president, Dixie Sand & Gravel Co., Chattanooga, Tenn., reported 1936 business as 20 per cent. higher than that of 1935 with no change in prices in southeastern Tennessee, northwestern Georgia and northeastern Alabama. Forty per cent. of the industry's capacity was used. Half of the output went into road construction, 40 cent. into building and 10 per cent. for other purposes. This year promises no change in either output or prices, but a decrease in the percentage of tonnage going into roads and an increase for

The annual banquet, held Wednesday night, Dec. 9, in the grand ballroom of the Peabody Hotel.

EQUIPMENT EXHIBITS AT MEMPHIS

LEFT (top to bottom): United States Steel Corp., General Electric Co., Ludlow Saylor Wire Co., Northwest Engineering Co., Jaeger Machine Co. RIGHT (top to bottom): Fairbanks, Morse & Co., Kensington Steel Co., A. Leschen & Sons Co., Hardinge Co., Thew Shovel Co.

building. The competition of the Tennessee Valley Authority and one portable stone plant is troublesome.

H. P. Caldwell, Ohio River Sand Co., Louisville, Ky., reported an increase of 38 per cent. in 1936 in his company's territory. Prices declined somewhat. The ratio of output to capacity was about 50 per cent. The output was used for roads (40 per cent.), for building (45 per cent.), for ballast (5 per cent.) and for other purposes. No increase in business is expected in 1937 and no change in prices. There are but two county-owned plants in the area.

In central eastern Illinois and central western Indiana 1936 business was up 10 to 35 per cent., according to E. Guy Sutton, vice-president, Neal Gravel Co., Mattoon, Ill. Prices were generally constant, although there were a few decreases. The product was distributed 40 per cent. to roads, 40 per cent. to building, 15 per cent. to ballast, and the remainder to other purposes. This year the volume of business should rise 10 to 15 per cent., and prices should keep step with mounting costs. In Illinois $32,000,000 in motor-vehicle taxes was diverted to other uses; there was no diversion in Indiana. W.P.A. sand loading from wayside pits has caused no loss to established producers as otherwise this type of work would probably not have been done. The W.P.A. has helped portable plants by using "easy" specifications.

In Minneapolis and St. Paul 1936 business increased 35 per cent., according to E. H. Norblom, president, Landers, Norblom, Christenson Co., Minneapolis, and in half the sales prices were higher than in 1935. The industry used about 40 per cent. of its capacity. Roads took 35 per cent., building 40 per cent. and other uses the remainder of the total output. In 1937 the output will probably be about 40 per cent. bigger and prices from 15 to 20 per cent. higher. Outside Minneapolis as much as half of the output is in some localities produced by county-owned plants.

Ray V. Warren, representing the Western Pennsylvania Sand & Gravel Assn. of Pittsburgh, reported a 32-per cent. rise in output in his territory in 1936, an increase of 395,000 tons. Prices rose 2 c. a ton. Both tonnage and prices will go up in 1937. There has been no diversion of state motor-vehicle funds beyond a borrowing of $17,000,000 which will be repaid.

In Ontario, Canada, according to G. G. Robinson, chief engineer, Consolidated Sand & Gravel, Ltd., Toronto, business in 1936 was double that of 1935 and prices were slightly higher. Only 25 per cent. of the industry's capacity was utilized. Of the total prod-

uct 65 per cent. went into roads, 20 per cent. into building and 15 per cent. into ballast. In 1937 the tonnage should be substantially greater. Portable plants offer considerable competition but the trend is away from their use.

Paul P. Bird, president, Boston Sand & Gravel Co., Boston, reported a 25-per cent. rise in output for New England in 1936 and a similar increase in prices. About half of the industry's production capacity was utilized. Roads took 60 per cent. and building construction 30 per cent. of the total output. No increase in tonnage or prices is expected in 1937. In 1935 Massachusetts diverted 40 per cent., or $9,500,000, of its motor-vehicle and gasoline taxes to non-highway purposes; the total diversion for New England was $17,500,000. There was no diversion in Maine, New Hampshire or Vermont.

H. Herbert Hughes of the U. S. Bureau of Mines stated at this point that railroad shipments of sand and gravel were 35 per cent. higher in 1936 than in 1935 and those of crushed stone and slag 29 per cent. Water shipments of sand and gravel in the Pittsburgh area rose 78 per cent. Portland-cement shipments were 50 per cent. higher than those of 1935, asphalt 34 per cent. and contract awards 65 per cent.

Legislative, economic and safety themes were dwelt upon in the Wednesday morning session, presided over by W. A. Bliss, vice-president, Keystone Sand & Supply Co., Pittsburgh, Pa.

The first paper entitled *What the Employer Should Know About Silicosis and Other Occupational Diseases* was presented by David S. Beyer, vice-president and chief engineer of the Liberty Mutual Insurance Co. Although the speaker said he realized there was little silicosis hazard in the sand-and-gravel industry in general it was up to the executives to keep abreast of developments in case changing production methods might alter the picture.

"Silicosis has been striking like lightning in recent years but unlike lightning it often strikes again in the same place," declared Mr. Beyer. Unemployment has played an important part in the rising tide of silicosis cases, real or imagined, he said. Unethical members of the legal profession have often approached unemployed workers in the mineral industries, induced them to file damage suits and often both lawyers and unemployed workmen have benefited financially through winning the case. Examination often indicates the presence of some dust in the lungs of the worker but whether he is actually suffering from silicosis or not has been hard to prove. There are very few competent silicosis specialists in the country, said Mr. Beyer, and jury sympathy is usually with the worker anyway so that the proportion of victories to defeats in silicosis damage suits has been too high.

Persons predisposed to tuberculosis, he said, usually develop silicosis when working in dust and when they are definitely tubercular they contact the disease in a very short time. He warned those present that one of the most important steps in combating the problem was that of making periodic physical examinations compulsory.

Recent developments of mechanical methods to eliminate dust at its source, Mr. Beyer said, are proving their worth and he predicted important advances in this way of controlling the inroads made by the disease in the immediate future. He made particular reference to the dust counter (see PIT AND QUARRY, Dec., 1936, p. 36) recently introduced by one of the large optical firms as being of great value in determining the existence of hazardous conditions when dust is present in the atmosphere.

The speaker cited numerous statistics during the course of his talk, pointing out that while 26 states have occupational-disease laws, only six or seven of these cover silicosis.

Following Mr. Beyer's talk, Irving Warner, vice-president and chief engineer of the Warner Co., Philadelphia, told of some recent tests among its employees. Although his company's executives had assumed there was no silicosis hazard in its sand-and-gravel operations, two old crusher employees were selected a short time ago as the subjects of intensive and prolonged examinations which, happily, resulted negatively. The knowledge that these employees, who had long worked about the crushers, were not affected by the dust was well worth the time and expense of the examinations, Mr. Warner declared, and urged other operators to conduct similar tests for their own peace of mind.

Vincent M. Miles, attorney of Fort Smith, Ark., and a member of the Social Security Board, reminded the delegates that production of sand and gravel had declined 52 per cent. between the years of 1929 and 1933 with a consequent decreased in employment.

"The insecurity of our people is a problem that is with us always, during good times and bad," the speaker said. "The Social Security Act is not an emergency measure but a long-range plan for the future. Its adoption is recognition that the depression is passing. Security for workmen has long been needed and I am happy to say that our act is American and not European in principle.

"The plan as adopted is a federal-state system," said Mr. Miles, "making unemployment compensation economically possible." He reviewed the highlights of the law as passed and urged the coöperation of business and industry in eliminating any objectionable features which may develop and in adding new measures which may be needed to make the act effective and workable. He pointed out that 17 states and the District of Columbia have enacted jobless compensation laws and expressed the hope that other states would join the ranks as speedily as possible.

"This compensation is not a panacea for the hazards of unemployment but a method of budgeting to meet an inevitable cost of industrialization," Mr. Miles stated. "The plan is obviously better from a strictly business standpoint than any system of relief hastily set up in a financial crisis when funds are more difficult to raise."

The sight of so much machinery in the exhibit adjoining the meeting prompted Mr. Miles to compare the care which the good producer takes of his equipment during times of idleness so that it will be ready for service again when business recovers with the usual practice of turning its human machinery—its workmen—out into the cold without a thought as to how they will survive until the skies clear again. "The Social Security Act will take care of that in the future," he said.

"Accidents don't just happen—there is always a definite cause that usually can be eliminated by the wide-awake employer," declared Franklin K. Wills, safety director of the Warner Co. in his address on *Safety Through Plant Organization*. Mr. Wills' talk was illustrated with slides which depicted some of the mechanical safeguards that have been installed in the Warner operations, particularly on its rolling stock.

Care in hiring and placing men is the first important step in a thorough safety program, he said. Examinations before employment to determine physical health and periodically afterward are necessary. "We usually put a new man at work in the labor gang so he can get the general 'feel' of our operations and the attitude toward safety," Mr. Wills said.

"Bulletin boards carrying safety messages and mimeographed safety bulletins have proved their value in putting an idea across. We also have found that mass meetings of workmen, where accidents are analyzed by our safety committees, make the men more conscious of existing dangers and they really learn how to avoid similar mishaps.

"We strive constantly to maintain close and friendly relations with the workmen and have encouraged them to take pride in our safety program. This

EQUIPMENT EXHIBITS AT MEMPHIS

LEFT (top to bottom): John A. Roebling's Sons Co., W. S. Tyler Co., Cross Engineering Co., Model Plant at Cross booth, Pioneer Gravel Equipment Mfg. Co. RIGHT (top to bottom): American Manganese Steel Co., Morris Machine Works, Austin-Western Road Machinery Co., Allis-Chalmers Mfg. Co., Marion Steam Shovel Co.

coöperation has also aided us in our good-housekeeping efforts and, while it seems time lost in unproductive work, we spend a half-hour daily in cleaning up around the plant. Walkways are kept free of obstacles that might cause a man to trip and fall. Tracks are also cleaned up and the decks of floating equipment are given special attention to eliminate the danger of the men stumbling and falling overboard.

"One of the most important parts of our accident-elimination program has been a set of strict rules of conduct and inspection of equipment. No one but the plant electricians are allowed to handle the power cables, and cut-off switches have been provided in case of emergency. We never allow our men to ride on moving conveyors and elevators. Hand rails and wide stairways have been erected wherever possible. All hand tools and air equipment are inspected regularly."

V. P. Ahearn, executive secretary, gave a short review of the Robinson-Patman and Walsh-Healy Acts to close the Wednesday morning session. He took up some of the main points of the legislation, pointing out their particular effects upon sand-and-gravel producers.

Producers and equipment makers joined in a luncheon shortly after noon on Wednesday to hear an inspiring talk by Congressman Walter Chandler of Memphis and to witness and applaud the award of safety plaques and certificates to winners of the association's safety contest.

With Alexander Foster, Jr., presiding, the session opened with a brief welcoming address by Memphis' fire and police commissioner, Clifford Davis. Presentation of the safety trophies, one to the American Aggregates Corp., and the other to the Warner Co., was made by John Prince, president, Stewart Sand & Material Co., Kansas City, Mo. A number of companies who gained honorable mention in the contest were awarded certificates.

Congressman Chandler reassured those at the luncheon that the big objective of the next Congress is to maintain and extend prosperity.

"Unemployment is the biggest problem facing the nation to-day. Americans do not want the dole and only business, industry and the government can provide the necessary employment," he said.

"Congress knows that industry and business have provided great services to the public, that they require capital built from profits. The profit motive must not be destroyed but the gorging motive must be eliminated. Ordinarily the government has listened to business; now business must learn to listen to

the government, for a while at least.

"The underlying reason for the opposition of business to the administration is the fact that business and industry have lost control of the country. No permanent industrial peace will come until labor receives incomes that make possible a comfortable family life. Congress will undertake to bring about the desired results by constitutional methods."

The congressman said that probable legislation during the forthcoming session would include continued Federal aid for highway construction; a broad flood-control program; an amendment to the tax law to remove hardships on small corporations; the repeal of luxury taxes, with no new taxes in prospect; a new food-and-drug act; and continuation of the president's power to devalue the dollar.

At the Thursday morning meeting, which was presided over by J. Rutledge Hill, vice-president, Gifford-Hill & Co., Dallas, Tex., Alexander Foster, Jr., vice-president of the Warner Co., and Stanton Walker, Director of Engineering of the association, reported on wear and strength tests of gravel and crushed-stone concrete. The authors pointed out that most concrete tests involving different aggregates have been based on methods of proportioning which result in unequal cement contents and other varying conditions making direct comparisons, on a proper basis, difficult. As a result much confusion has arisen as to the effect of the type of aggregate and, particularly, as to the effect of the shape of coarse aggregate particle. For the tests reported the attempt was made to eliminate some of the variables which have led to confusion.

According to the authors a consideration of the structure of a concrete mixture should make it evident that, within broad limits, the shape of particle should not be expected to affect either the compressive or tensile strength, except in so far as it affects the proportioning of the concrete. The strength of concrete depends upon the strength of the mortar and of the coarse aggregate particles and upon the bond between the mortar and the coarse aggregate. Within wide limits the shape of the particle does not affect the strength of that particle, nor does it have any effect upon the strength of a given mortar. The bond of the mortar to the coarse aggregate, they point out, is not influenced by the shape of the coarse aggregate particle since glue adheres just as well to a rounded surface as to a series of flat surfaces.

The paper stresses the importance of taking into account the shape of the coarse aggregate particle in the *proportioning* of concrete. Less mortar is required in the case of rounded aggregates than in the case of angular ones to fill the voids and to spread the coarse aggregates apart so that a workable mixture is obtained. Therefore, for a given amount of cement, a richer mortar may be used with rounded aggregates than with angular aggregates.

The data reported were taken from five groups of tests, three of which were made for the Warner Co. by the Pittsburgh Testing Laboratory and two of which were made in the Research Laboratory of the National Sand & Gravel Assn. The investigations for the Warner Co. involved comparisons of the compressive and flexural strength and resistance to abrasion of concrete made with gravel varying in grading and percentage of crushed particles and with a high-grade trap rock and an average quality of crushed limestone. Studies of the workability of concrete were also made with gravel having different percentages of crushed particles and varying in grading within the limits of a typical state highway specification.

The tests carried out by the National Sand & Gravel Assn. involved comparisons of the compressive and flexural strength of concrete made with gravel having varying percentages of crushed particles and of concrete made with a high-quality crushed limestone, one lot of which was tested as received and the other of which was well rounded, to simulate gravel, in a Deval abrasion machine.

As a result of the tests the authors conclude that crushing gravel, for the purpose of making it angular, does not alter its quality as a concrete aggregate. In that connection they direct particular attention to the tests of the rounded and angular crushed stone.

While the authors recognize the somewhat limited scope of the tests, they point out that the materials tested were typical and that the results may be considered as representative of a set of conditions which are widely applicable. They serve to illustrate, they point out, the type of relationship to be expected in reasonably comparable mixes.

The paper stresses the fact that the significance of tests such as those reported extends beyond a mere consideration of strength. They have a direct bearing on the problem of the cracking of concrete roads. The authors conclude, from a study of these tests and of many others along similar lines, that differences in the cracking of concrete roads due to differences in the aggregates come from differences in characteristics applicable to all aggregates, and that it can be maintained successfully that rounded-aggregate concrete as a class does not crack more than angular-aggregate concrete and that it does not have less ability to resist the factors which cause cracking.

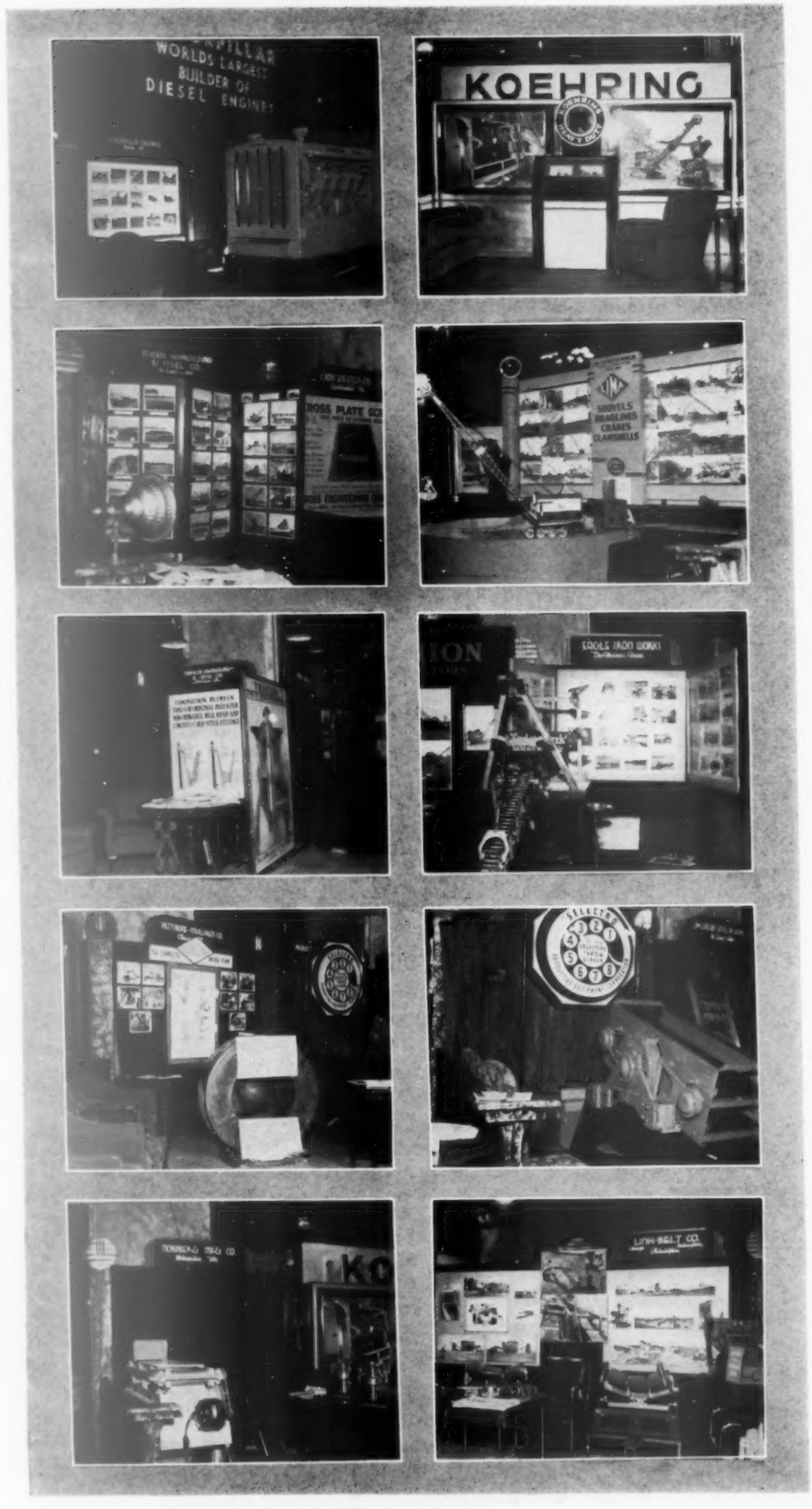
In *Needed Research in Aggregates for the Construction Industry* C. H. Scholer, professor of applied mechanics, Kansas State College of Agriculture, and chairman of the Department of Materials and Construction, Highway Research Board, National Research Council, discussed the aims, objects and difficulties of research in general. Research by trade associations, the weaknesses of the methods used, the importance of their results, and the budgeting of funds for research all received attention. One of the important duties of any research department, he said, is to foresee questions which will arise and to have ready a solution of these problems before the industry demands it.

Mr. Scholer advised tolerance toward specifications which seem unnecessarily strict as builders of concrete structures have had so many failures in the past due to poor materials that they now lean to the safe side. He urged producers to watch all the jobs on which their materials are used in order to protect themselves against undeserved blame for any possible failures. Mr. Scholer also advised adding to the association's research staff so that more field work, so necessary to effective research, can be done. He praised the association, and Stanton Walker in particular, for the effective work that has been done in spite of the lack of sufficient funds.

P. J. Freeman, principal materials engineer, Tennessee Valley Authority, spoke extemporaneously on *The Selection of Fine and Coarse Aggregates for Dam Construction.* He began by defending the action of the T. V. A. in producing its own aggregates at Norris Dam, which action resulted in a saving of three-quarters of a million dollars. The cost of shipping in aggregates, said Mr. Freeman, would have been prohibitive and there was no possibility of conducting a commercial dredging operation because of the absence of suitable deposits. He pointed out that at other T. V. A. projects, where suitable deposits were available, aggregate contracts were let to commercial producers.

In discussing some of the special problems relating to specifications for aggregates used in large dam construction Mr. Freeman stressed the importance of an accurate grading of the fine aggregate and the durability of both the fine and coarse aggregate. These things, he said, are necessary in order to insure the almost indefinite life to such a structure which alone justifies its construction. In this and other kinds of concrete work, said Mr. Freeman, an efficient laboratory is the aggregate

EQUIPMENT EXHIBITS AT MEMPHIS



LEFT (top to bottom): Caterpillar Tractor Co., St. Louis Shipbuilding & Steel Co., Traylor Engineering & Mfg. Co., Pettibone-Mulliken Co., Nordberg Mfg. Co. RIGHT (top to bottom): Koehring Co., Lima Locomotive Works, Eagle Iron Works, Productive Equipment Corp., Link-Belt Co.

industry's best protection against being unfairly blamed for poor concrete. He pointed out that aggregate control in the past had been almost entirely in the hands of the large consumers.

J. L. Shiely, president of the J. L. Shiely Co., St. Paul, which joined with the Becker County Sand & Gravel Co. in the production of sand and gravel for Fort Peck Dam, spoke on the *High Costs of Production Resulting from Unwise Specifications*. As an example, the specification on decantation tests provides a maximum residue of 5 per cent. Authorities originally construed this to mean 5 per cent. by volume and caused considerable unnecessary trouble and expense to the producer as a result. Now this is accepted to mean 5 per cent. by weight, which is equivalent to about 10 per cent. by volume, a much more reasonable and easily attainable result. He also criticized the lack of coördination between the various governmental bodies in their specifications. According to Mr. Shiely, stone dust is prohibited on some projects but is specified on others. His advice to producers taking government contracts is to understand the specifications thoroughly, as sometimes none of the usual tolerances are permitted and other rulings are strictly adhered to without regard to the character of the raw material available and the cost to the producer.

Mr. Shiely also described interesting and unusual methods used on this project. About 3,000,000 cu.yd. of gravel from ½- to 6-in. was produced for the toe of the dam. Most of this was screened dry during the winter season. The handling of this material during extremely cold weather was made possible by electric heating which was practical due to the low power rate. Electric heaters were installed in the sides of the hoppers and low-voltage current was passed through the screen cloth.

T. E. McGrath, vice-president of the McGrath Sand & Gravel Co., Lincoln, Ill., was not present at this meeting and Stanton Walker read his paper on the *Market for Plant-Prepared Sand and Gravel in Traffic-Bound Roads*. It is said that Mr. McGrath's efforts are largely responsible for the diversion to commercial producers of much of the demand this low-cost material which had formerly been secured from the cheapest available sources.

An important feature of the campaign to inform county and township officials of the advantages of properly graded and prepared aggregates was a pamphlet issued under his direction. Because of the haste with which many road projects in Illinois were put under way county and township officials had no time in which to coördinate their specifications and for a time, said Mr.

McGrath, one of the company's plants was producing materials to meet seven different specifications.

Bituminous Mixtures and the Place of Sand and Gravel in Them were discussed by Julius Adler, consulting engineer, Philadelphia, at the Thursday afternoon session, presided over by Robert J. Potts. He said that bituminous mixtures might be classified in two ways: (1) according to the grading of the aggregates as either (a) "dense mixtures in which the aggregates are so graded as to reduce the voids to the minimum" or (b) open or somewhat porous mixtures; and (2) according to the method of production, as either (a) "plant mixtures produced in mechanical mixers at central plants" or (b) "road mixes in which the mixing process is accomplished on the surface of the road where the material is to be used."

In the making of dense mixtures "sufficient bitumen is used to coat the surfaces of the aggregate with a comparatively thin film and to fill the remaining voids in the mixture. The fine particles of aggregate and the bitumen form a bituminous mortar which adheres to and binds the coarser pieces of aggregate into a dense, tough mixture which excludes water and resists displacement by traffic." Their density and the strength of their bituminous cement are chiefly responsible for the durability of pavements made of these mixtures.

Porous mixtures are those in which "the quantity of bituminous mortar is insufficient successfully to bind together the coarse aggregate." Reliance is placed, therefore, on a thicker film of bitumen on the surface of the coarse aggregate to aid in cementing adjoining particles and on the mechanical interlocking of angular pieces of coarse aggregate.

The "highest type, most durable mixtures can be made only in plants designed for that purpose," said the speaker. "Such plants can be operated at times when 'road mixing' is impossible. They make possible the production of dense mixtures through the combination of two or more sizes of aggregate proportioned for the reduction of voids"; they allow the "use of harder and stronger bitumen by heating it and drying or heating the aggregate so as to facilitate the mixing"; and they "produce uniformly-proportioned and intimately-mixed combinations of mineral matter and water to a degree which is impossible under all the conditions which pertain to 'road mixing.'" These mixing plants are equally suited to the production of materials for "cold mix" bituminous concrete.

In "road mixing" the aggregate is spread on the surface of the road, the bitumen is applied, and the mixing is accomplished by mechanical means. The method meets the demand for a "waterproof, reasonably smooth and durable road surface" that can be placed at low cost for lightly-traveled roadways. The coating of the aggregate is done with a naturally-liquid bitumen. The cementing bitumen may embody oils which are highly volatile, partially volatile, or hardly volatile at all, producing respectively rapid, medium, or slow curing. The first dry quickly and give a moderately strong bituminous cement, the second give the same result with slower drying, and the third remain liquid indefinitely.

Rapid-curing bitumens dry too quickly to allow fine, dusty or slightly damp aggregate to be thoroughly incorporated, but they are satisfactory with the clean, relatively coarse aggregate produced by commercial plants. When the aggregate includes particles as small as sand grains, slow-drying bitumens are necessary to accomplish the thorough incorporation of the oil with the mineral matter. There is a certain amount of instability in road surfaces of this type, as is shown by the fact that they sometimes become uneven under traffic. The trend is away from "road mixing" and toward the greater use of plant-mixed materials.

"The best outlet for commercially-produced sand and gravel will be through the medium of plant mixes" —hot or cold—"in which accurate proportions, low voids, and stronger bitumens can be used to produce mixtures which are not dependent (as in the case of the open or porous type) upon angular fragments of coarse aggregate for their stability." Where "road mixing" continues to be important it will be necessary to consider: "(1) The use of a well-graded coarse aggregate in which the voids are reduced and the points of contact between adjoining pieces of aggregate greatly increased as compared to approximately one-size material; (2) the use of viscous bitumen (even though moderate heating is required prior to its application) which will develop definite bonding strength and yield a thicker and stronger coating on the surfaces of the pieces of aggregate than is possible with more liquid oils; (3) the use of a closely-knit seal coat of fine gravel and the same type of bitumen which, properly applied, will protect the underlying material from the direct raveling action of traffic."

The speaker advised further study along these lines: "(1) The assembling of data relative to the methods of use and results with the use of sand-and-gravel products in bituminous work under varying conditions; (2) further laboratory studies dealing with the behavior of bituminous sand-and-gravel mixtures after careful consideration of the necessity for simulating in the laboratory the conditions to which the material is subjected in actual service; (3) these investigations to be accompanied by the desirable steps necessary to secure the preparation of specifications in the form best adapted to the successful use of sand-and-gravel products."

Irving Warner, vice-president and chief engineer, Warner Co., Philadelphia, described the experiences of his company in the recovery of sand and gravel by dredging and its delivery by water transportation. He compared this method with recovery through the use of a large drag-line. He has found several disadvantages in the latter method in his own company's experience, such as: (1) The wet raw material was "very punishing" to the cars because of its great weight and fluidity; (2) the accumulation of water at each point of loading puddled the soil and made maintenance of the track difficult, a condition aggravated by water draining from the cars all the way into the plant; (3) relaying the track on each new cut was costly; (4) there was no flexibility in moving to different points of the deposit to vary the raw material to approximate the relative sales demands for sand and gravel. Unless there is from 15 to 20 ft. of good material below the water level water recovery and transportation are not feasible.

In dry plants flexibility is sometimes attained by having a number of primary excavators and operating them preferentially. But, he pointed out, a single dredge can easily be relocated to dig the most advantageous material. His company sells all its sand, Mr. Warner said, and for that reason may attach more importance to flexibility than it would otherwise do. Very efficient sand-settling pits are used to recover the sand.

His company's production problem is to excavate the desired material at the right time and to produce different grades of concrete sand, the state highway departments of Pennsylvania and New Jersey and the cities along the Delaware River having different specifications. The dredge can easily be moved about to meet these varying conditions.

The Warner Company's Van Sciver plant has a "par" output of 840 tons per hr. and it has frequently produced this quantity of material for days at a time; the plant's momentary capacity is well over 1,000 tons per hr. of finished material. The dredge cost $150,000 and is operated by electricity brought from the shore.

The company uses hopper-bottom barges which are loaded above the deck level so that the surplus water will

EQUIPMENT EXHIBITS AT MEMPHIS

LEFT (top to bottom): Blaw-Knox Co., Harnischfeger Corp., Taylor-Wharton Iron & Steel Co., Simplicity Engineering Co., Rock Products. RIGHT (top to bottom): Robins Conveying Belt Co., Bucyrus-Erie Co., Chain Belt Co., Hendrick Manufacturing Co., Pit and Quarry.

drain off. The Manor plant barges carry 315 tons each and those at the Van Sciver plants 210 tons. [Twelve new 1,000-ton steel barges have been purchased at a cost of from $12,000 to $15,000 each.—EDITOR.]

The dredges have continuous bucket lines, using the "eastern" or double-chain type with spaced buckets of large capacity. Mr. Warner believes that the so-called "western" type, using small oval buckets whose bases form the chain, is superior, although the other type is satisfactory, economical and reliable.

Unloading is done by a continuous-bucket elevator, which is lowered into one end of the boat; the latter is then pulled through against the buckets by a powerful hoist. Despite the fact that an empty boat must be pulled out of the unloading dock before a loaded boat can be pulled in, the lost time between boats is only 2½ min. At the Manor plant the unloading slip parallels the shore line and the bucket line is set at right angles to the rest of the plant. The flow of boats is, therefore, continuous and the lost time between boats is only 1 min. This saving increases the output capacity of the plant by 50 to 60 tons an hr.

Tugs with Diesel engines of 100- to 120-hp. and about 50-ft. long are satisfactory and a new boat of this type, built of steel, has been ordered.

Mr. Warner does not favor the use of pumps for transporting the dredged material as the economical pumping distance with 15-in. to 20-in. pumps is about 1,300 ft., whereas the company is now transporting its material more than a mile at the Manor plant and will reach a mile-haul at the Van Sciver plant within two years. He believes that a pump can excavate from a semi-circular area having about a 1,200-ft. radius, but that for greater distances "boosters" are necessary.

He compared the costs of two pumping plants, both using 20-in. pumps with 1,000 to 1,200 ft. of line and a discharge final lift of 15 to 25 ft. The total digging and transporting cost with one plant was 9.92 c. per ton, of which 0.74 c. was labor, 5.13 c. repair material and labor, 0.25 c. supplies, 1.66 c. power, and 2.14 c. depreciation. On the other plant the total cost was 11.53 c., of which 1.83 c. was labor, 3.60 c. repair material and labor, 0.04 c. supplies, 3.17 c. power, and 2.89 c. depreciation.

Some interesting *Trends in Sand-and-Gravel Production* were discussed by H. Herbert Hughes, mineral economist, U. S. Bureau of Mines. He referred to the rise in sand-and-gravel output from 23,204,967 tons in 1905 to the "peak" figure of 227,571,905 tons in

1929. The period from 1923 to 1929 was the era of large-plant building. Crushed-stone production, like that of sand and gravel, grew most rapidly from 1920 to 1929. In that decade crushed-stone output was about half that of sand and gravel in tonnage. Non-commercial production affected the sand and gravel output materially, because it increased from less than 10,000,000 tons in 1928 to about 40,000,000 tons annually in the last three years. Non-commercial production of crushed stone remained at about 8,000,000 tons annually from 1929 to 1933 but jumped to approximately 17,000,000 tons in 1934 and 1935.

Since 1928 considerably more gravel has been used for building and paving than crushed stone, although prior to 1929 sand, gravel and crushed stone were used for these purposes in about equal quantities. Gravel still exceeds stone in the quantities used for railroad ballast.

Non-commercial production of sand and gravel and crushed stone by states, counties, municipalities or other governmental agencies and contractors expressly for their consumption, which amounted to no more than 10 per cent. of the total prior to 1931, rose to 39 per cent. in 1933 in the case of sand and gravel and 17 per cent. in that of crushed stone.

Only 19 per cent. of all the non-commercial material produced in 1935 was washed, screened or otherwise prepared and this had an average value of 53 c. a ton compared with 27 c. for unprepared material. Of the total noncommercial output 22,011,231 tons valued at 22 c. a ton was produced directly by construction or maintenance crews of states, counties, municipalities and other government agencies, while 17,305,221 tons valued at 34 c. a ton was produced by contractors for the use of such agencies. State highway departments accounted for 56 per cent. of the total output, counties 40 per cent., municipalities 3 per cent. and other agencies 1 per cent.

The output of small plants forms an increasing percentage of the total sand-and-gravel output. In 1931 32 per cent. of the total output was produced by plants making less than 100,000 tons each, but in 1935 this group produced 42 per cent. of the total. Nevertheless, 36 plants in 1935 produced 28 per cent. of the total output.

At a meeting of members of the Manufacturers' Division of the Association a resolution asking for a consolidation of the sand-and-gravel and crushed-stone shows into a single exposition, as was done in recent years, was unanimously passed.

The Machinery and Equipment Exhibition opened with a buffet supper and interesting displays of the products of 42 exhibitors, whose booths are shown in the accompanying pictures. The Pettibone Mulliken Co., Chicago, offered three prizes—a Gladstone bag, a traveling bag, and a brief case—to the three closest guessers in a contest held during the exposition. The contestants were asked to guess how many revolutions were made by a 15-in. dredge-pump impeller in handling 264,680 tons of material. Pettibone Mulliken engineers estimated the number of revolutions at 19,829,632. The first prize was won by R. M. Waters of the Waters & McCreary Co., Columbus, Miss., with a guess of 19,800,000. H. Herbert Hughes of the U. S. Bureau of Mines took second prize by guessing 25,000,000, and Sam Chesser, Waters & McCreary Co., Columbus, Miss., was given the third prize for his guess of 13,500,000.

Another contest, conducted by the Simplicity Engineering Co., was won by Walter W. Ropers of the McGrath Sand & Gravel Co., Peoria, Ill. The prize was a pigskin Gladstone bag.

Ready-Mixed-Concrete Makers Discuss Production, Marketing

ROUND-TABLE discussions of sales and production problems characterized the seventh annual convention of the National Ready Mixed Concrete Assn. in Memphis, Dec. 11 and 12. Sales methods and business conditions were discussed briefly by manufacturers from different parts of the country, and the handling ready-mixed concrete in cold and hot weather, control and inspection methods, research, and concrete standards were the production problems discussed.

In his brief opening address President J. L. Shiely emphasized the importance of a national organization to protect the industry's interests in legislation and in governmental bodies using the industry's products. He spoke, too, of the association's need for more income to carry on useful work and to increase its present curtailed activities.

One of the chief sales problems in his territory is price, according to J. H. Dixey, vice-president, Transit-Mix Concrete Co., Inc., New York, who opened the discussion on *Sales Methods*. New York State specifications call for premium concrete on a strength basis, but the city of New York has not yet adopted them. Mr. Dixey believes that the more rigid the specifications, the more the ready-mixed-concrete manufacturer has to offer in the way of specialized service.

H. F. G. Pelsue, comptroller, Graham Bros., Inc., Los Angeles, considers that his company is not merchandising a product but selling a service. The limit of a concrete manufacturer's capacity is, in his company's opinion, the number of truck-hours available for a month's business. The cost equals the variable transportation cost per hour, the variable plant cost, the fixed transportation and plant costs, overhead and profit. To cover these items the price must be set right. His company found that it had available in the average month 3,400 truck-hr., of which 2,700 were needed to meet the demand. Dividing the total monthly cost by 2,700 gave the return per truck-hour. The trip time determines the cost on each specific job. An examination of the contractor's job set-up will determine the price quoted. The hourly cost, exclusive of the cost of materials and the variable plant cost, is $5.40. The average capacity of the company's mixers is 3½ cu.yd.

His company charges its customers $2.50 per hr. for all time in excess of the free standing time estimated for each job and credits them $3 per hr. for the time saved. This plan saved in one period 266 truck-hr. at a cost of only $300. Certificates of credit issued when the time is saved are accepted as payment for concrete bought at any time within a year. Each customer's billing is for the gross charge and credit certificates to be applied against it must be returned with the check tendered in payment.

Ray V. Warren, Western Pennsylvania Sand & Gravel Assn., Pittsburgh, said that all the ready-mixed-concrete manufacturers in Pittsburgh belong to an association which watches prices and trade practices. The dues are 2 c. a cu.yd. He told also how the entrance of truck-mixers broke up a $400,000 central-mixing business in his city.

On the subject of *Handling Ready-Mixed Concrete in Cold Weather*, Irving Warner, vice-president and chief engineer, Warner Co., Philadelphia, said that theoretically 2 boiler hp. per cu.yd. per hr. is needed in his latitude to heat concrete; however only half of

that amount of heat has been necessary. It is probable, he thinks, that the cement in the concrete generates some heat. His company does not heat the aggregates but furnishes hot water for heating the concrete during the day and heat for drying the aggregates at night. It uses a 200-hp. boiler which is kept at 15-lb. pressure to force the water out. It uses hotter water for concrete with a low water ratio and cooler water when more water is introduced. The water is sent direct from the boiler to the mixer-trucks, which it enters at less than 200 deg. F. Where small boilers are used, tanks for storing hot water are needed. The company is delivering concrete having a temperature of about 70 deg. F. This requires a mixing-water temperature of about 140 deg.

Alexander Foster, Jr., vice-president in charge of distribution of the Warner Co., said that 85- to 90-deg. concrete stiffens in transit. Once, when the temperature of the atmosphere was 35 deg. F., concrete of 1-2-4 mix and a 6-in. slump leaving the plant with an initial temperature of 90 deg. arrived at the end of a ¾-mi. haul with a slump of 1 in., the mixer running at 4 r.p.m. Similar results were obtained when the outside temperature was 90 deg.

It is more difficult to control the temperature of the concrete in the forms than that of the concrete when delivered, said R. B. Young, Ontario Ready Mix Concrete, Ltd., of Toronto, Can. The heat losses between leaving the plant and arrival at the job are negligible. The only object in heating the aggregates is the prevention of freezing which can be accomplished by keeping their temperature between 40 and 50 deg. F. Live steam offers the easiest method as the materials have low heat conductivity and many air spaces, so the heat transfer is accomplished quickly. The excess moisture introduced by this method can be cared for by drainage with quite uniform results. Where drainage is not provided, the last foot of the stock-pile need not be reclaimed.

Concrete is delivered at a temperature of 70 deg. F. by his company, according to Gage W. Cooper, Cooper Supply Co., Detroit. The aggregates are kept at a temperature between 45 and 50 deg. His company adds calcium chloride to the concrete to assist the contractor in maintaining control, but this causes a little trouble in cleaning the mixers.

J. L. Shiely, president, J. L. Shiely Co., St. Paul, told of loading out from 100 to 150 cu.yd. per hr. in outside temperatures between —20 and —30 deg. F. The aggregates are heated to make continuity of operation possible by a boiler placed 30 ft. below ground-level. At his company's Montana plant, furnishing material for the Ft. Peck dam, electric vibrators on the aggregate bins dislodge the frozen material, which then becomes mixed with the warmer material. Outside temperatures there fall as low as —45 deg. F.

Handling Ready-Mixed Concrete in Hot Weather presents some difficulties in maintaining slump in Louisville, Ky., where the temperature of the city water rises at times to 85 and 90 deg. F. More trouble is encountered with drying in rich mixtures than in lean, according to James F. McCracken, general manager, American Builders' Supply Co. in that city.

J. E. Donelson, Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., reported the delivery of 800,000 tons of ready-mixed concrete in open-top trucks on hauls up to 10 mi. without trouble. His company uses slag as aggregate; this absorbs about 2½ per cent. moisture. Dry, hot, 95-deg. weather reduces the workability of the concrete.

The association's executive secretary, V. P. Ahearn, discussed briefly *Federal Legislation Affecting the Ready-Mixed-Concrete Industry*. He said that no wage rates for this industry had been determined under the Walsh-Healy government-contracts act and that, in his opinion, the present rates are legal until such rates have been fixed. He thinks, too, that employees working simultaneously on private and public work must conform to the law's requirements. It is difficult to segregate the time spent on government and on private work. The government seems to be interested in controlling hours and wages irrespective of the employer for whom the employee works, he believes.

The *Open Forum on Business Conditions* disclosed improved business in 1936 and better prospects for 1937 on the whole. For metropolitan Boston, Paul V. Bird, president, Boston Sand & Gravel Co., reported a 12-per cent. increase in volume for 1936 with about 75 per cent. of the industry's capacity utilized. Prices fell somewhat due to competition. Bridges, housing, and public buildings took most of the output as there was little privately financed construction. Two-thirds of the concrete poured in Boston in 1936 was ready-mixed. This year's business is expected to be 10 to 15 per cent. better. Most of the product is sold to meet proportion requirements and government specifications.

James F. McCracken, American Builders' Supply Co., Louisville, reported 1936 business 20 per cent. ahead of that of 1935 with prices "pretty good." Federal-aid work and distillery construction took most of the output. The prospects for 1937 are good." Concrete is bought to meet various specifications but the tendency is toward strength requirements.

Forty-four ready-mixed-concrete manufacturers in the Pittsburgh section operate 107 truck-mixers of 1- to 3½-cu.yd. capacity, owning from 1 to 32 trucks each, according to Ray V. Warren of the Western Pennsylvania Sand & Gravel Assn. Forty of these manufacturers produced 78,538 cu.yd. of concrete in 1933-4; 21 manufacturers produced 101,951 cu.yd. in 1936. Except for changes in discounts, prices have not been disturbed. The discount of $1 for quantities between 2 and 26 cu.yd. was discontinued. One manufacturer averaging $8.27 per cu.yd. in 1935 averaged $8.47 in 1936. The volume should be greater in 1937 and prices and costs higher. Most of the concrete is sold on proportions by weight.

Business in San Francisco, according to the report of Charles M. Cadman, president, Transit Concrete, Ltd., (presented by Carroll Stephens), was 25 per cent. better in 1936 than in 1935, the San Francisco-Oakland bridge taking 90 per cent. of the available truck-mixer time. There was no change in prices. Concrete manufacturers in the East Bay section entered under the California fair-practices act reported that an average gross spread in profit of 22 per cent. had been raised to 36½ per cent. by the necessity for conforming to the act's requirements. The credit situation has been greatly improved by the state's supervision of accounts and credits. There was no price-cutting in the East Bay area. This year's business should be 15 per cent. better. About one-fourth of the total product sold is strength concrete.

In the Los Angeles area, a section 15 by 30 mi. in extent, there are 3 concrete manufacturers, 18 or 20 batching plants and 51 truck-mixers, reported H. F. G. Pelsue, comptroller, Graham Bros., Inc., Los Angeles. Last year's business was 20 per cent. above that of 1935, and the industry operated at about 85 or 90 per cent. of its capacity. Prices rose slightly. Public buildings (chiefly schools), industrial buildings and residential construction consumed, in the order named, most of the output. This year's business may not be larger owing to the completion of the school-building program. Prices will rise with rising costs.

E. B. Rayburn, Jr., Ready Mixed Concrete Corp., Indianapolis, Ind., reported a 10- to 15-per cent. increase in business in 1936 and no change in prices. One-half of the output was used on government-aided projects, one-fourth on commercial jobs taking from 50 to 1,500 cu.yd. each, and the remainder in industrial reconstruction and mainte-

(Continued on page 91)

Progress of excavation for the main spillway at Bonneville Dam when the sand-and-gravel and concrete plants went into operation. Movable cableway towers are in background on Bradford Island.

AGGREGATES PRODUCTION AT BONNEVILLE

By W. E. TRAUFFER

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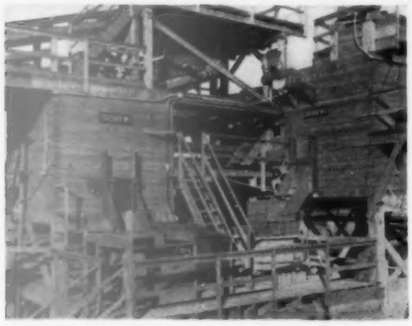
BONNEVILLE DAM, one of the many major dam projects now under construction for the Public Works Administration, has been given much publicity in both popular and engineering papers. The production of aggregates for this project, however, has received little publicity. It was the writer's privilege to inspect the sand-and-gravel and ready-mixed-concrete operations at Bonneville Dam shortly after they went into operation. As was the case with all the other large plants supplying governmental projects which have been described in PIT AND QUARRY, the Bonneville plants embody many features of operation and design of interest to commmercial producers of aggregates.

Bonneville Dam is the first of a series of ten dams recommended by the U. S. Army Corps of Engineers for improvement and development of the Columbia River. It is a navigation and power dam located about 43 mi. up the river east of Portland, Ore. Its purpose is to improve the navigability of the Columbia River, provide water for irrigation purposes, and to prevent infiltration of salt water into the upper reaches of the Columbia River. In designing the dam fishways were provided for the salmon which run in this river each year and form an important industry.

The dam is being built under two separate contracts. The first of these was let to the General-Shea Co., composed of the General Construction Co., Seattle, Wash., and the J. F. Shea Co., Portland, Ore. This contract was for the power-house and navigation locks which connect Bradford Island in the Columbia River with the Oregon shore and involves about 200,000 cu. yd. of concrete. The power-house will have an ultimate generating capacity of 430,000 kw. The facilities for supplying sand and gravel and ready-mixed concrete for this contract were completely described in the May, 1935, issue of PIT AND QUARRY, shortly after the pouring of concrete had been begun.

The contract for the main spillway

dam between Bradford Island and the Washington shore was awarded to the Columbia Construction Co., a combination of five of the Six Companies which built Boulder Dam. This contract involves over 600,000 cu. yd. of concrete. The main spillway dam will be 1,200 ft. long with a 900-ft. spillway crest and 50-ft. by 50-ft. vertical spillway gates. It will be 180 ft. thick at the base and 170 ft. high from the lowest foundation level. The pouring of concrete was begun Sept. 16, 1935.



Vibrating screen with oversize bin and jaw crusher at left. Bin and cone recrusher at right.

The sand-and-gravel plant of the Columbia Construction Co. is located at North Bonneville, Wash., on the north bank of the Columbia River, only a few hundred feet from the dam site. It has a capacity of over 500 tons per hr. and, compared to similar plants on other government projects, is unusually simple and compact. This plant was designed by Harry Davis, who supervised its erection and is now in charge of aggregate production and concrete-mixing operations. Mr. Davis has had a wide experience in aggregate and concrete production, having been connected with the Henry J. Kaiser Co. for over ten years. This plant went into operation late in August, 1935.

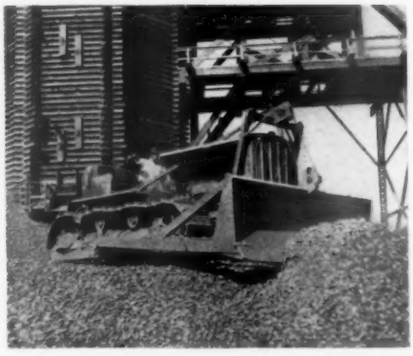
One of the two double-deck fine-sizing vibrating screens. Note perforated plate.

Most of the raw material is obtained from a deposit at Avery, Wash., 60 mi. upstream on the same side of the river as the plant. A Marion 125 drag-line loads the material direct into railroad cars. This material is slightly deficient in coarse sand and this is added from a deposit at Bingen, Wash., 30 mi. upstream from the plant. A small shovel loads this sand into trucks which take it to railroad cars for haulage to the plant.

At the plant the cars discharge into a 2-car track-hopper. Four Traylor vibrating feeders discharge the sand and gravel on two 30-in. by 25-ft. cross belt-conveyors which carry it to a 30-in. by 233-ft. belt-conveyor set at right angles to them. This main belt-conveyor (No. 3) is inclined and discharges its load at the top of the crushing building on a 4-ft. by 10-ft. Buffalo single-deck vibrating scalping screen which has punched plate with 6-in. square openings.

Material retained on this screen is discharged direct to a 30-ton bin from which it can be fed through a gate to a Wheeling 36-in. by 18-in. jaw crusher. This crusher reduces the oversize to 6 in. minus and its product is discharged on a 30-in. by 87-ft. belt-conveyor (No. 10), which turns this material to the main belt-conveyor (No. 3).

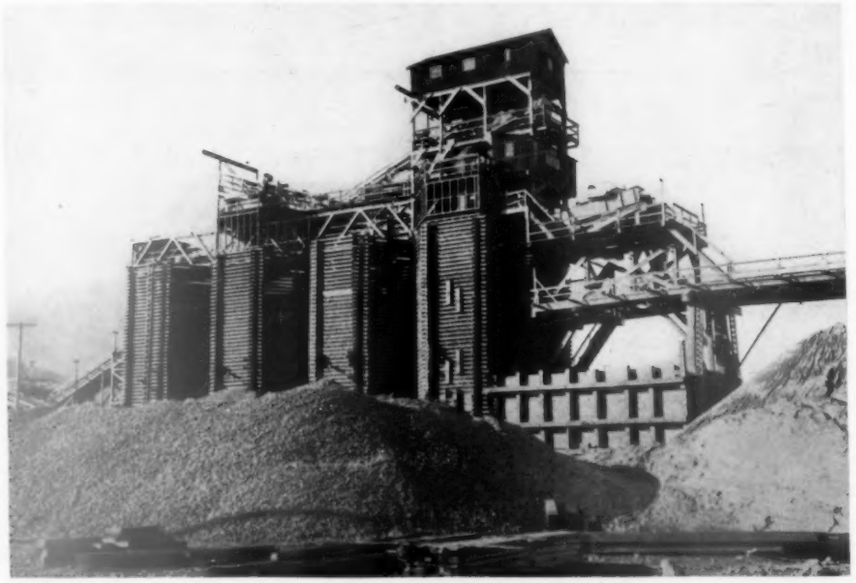
The material passing through the scalping screen is discharged on a 30-in. by 222-ft. belt-conveyor (No. 4) which carries it to a 5-ft. by 12-ft. Buffalo double-deck vibrating screen at the top of the plant. This screen is equipped with punched plate, 3-in. openings being used on the top deck and 1-in. on the bottom deck. The material retained on the top deck (3-in. to 6-in.) is discharged by means of a rock ladder into a bin. The material retained on the bottom deck (1-in. to 3-in.) is discharged on a 30-in. by 66-ft. belt-conveyor (No. 5).



Tractor and bulldozer being used to build up stock-piles.

This conveyor discharges into a split chute feeding two 4-ft. by 12-ft. Buffalo double-deck vibrating screens. These have 1¾-in. perforated plates on their top decks and ¾-in. on their bottom decks. The 1¾- to 3-in. material retained on the top decks of these screens is carried on a 30-in. by 25-ft. belt-conveyor to a rock ladder leading to a bin. The ¾-in. to 1¾-in. material retained on the bottom decks is also discharged to a bin by a rock ladder.

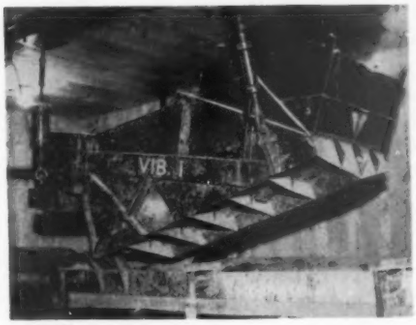
The minus 1-in. material passing through the bottom deck of the preliminary sizing screen is split to two 5-ft. by 12-ft. Buffalo double-deck sand screens which have ½-in. and ¼-in. openings. The material retained on these decks (¼-in. to 1-in.) is carried on a belt-conveyor to the two 4-ft. by 12-ft. secondary sizing screens which have already been described and which also receive the 1-in. to 3-in. material from the first sizing screen. The ¼-in. to ¾-in. material passing through the bottom decks of these secondary screens is



General view of gravel plant with crushers at extreme left and sand classifiers and sand-stockpiling conveyors at right.

pea gravel and is carried on a belt-conveyor to a bin.

The material passing through the bottom decks of the sand screens (minus ¼-in.) is chuted to a pair of Bodinson 6-ft. by 30-ft. sand classifiers. These remove excess fine sand and silt which are flumed with the wash-water to waste. The dewatered sand from these classifiers is carried on a 24-in. by 107-ft. horizontal belt-conveyor, equipped with a tripper, to a stock-pile. The materials from the two deposits were originally processed separately in the



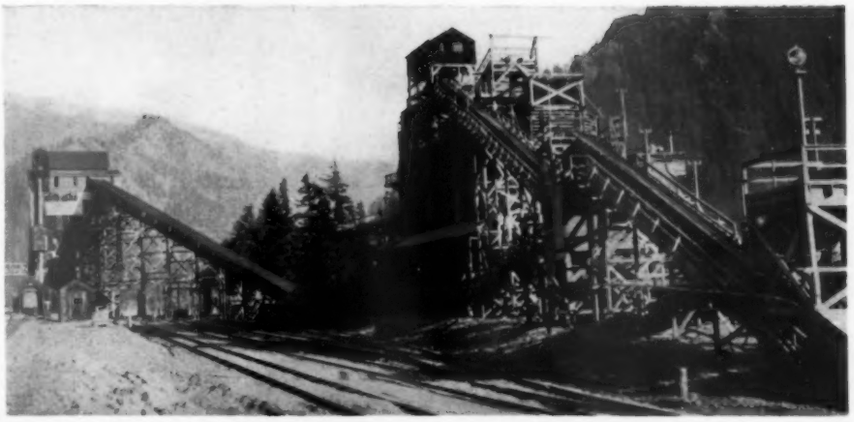
One of the four vibrating feeders under the receiving track hoppers.

plant, the fine sand from the Avery deposit going to one section of the stock-pile and the coarse Bingen sand to another section. Later it was found that better results were obtained by proportioning the two types of material and blending them at the track-hopper. This system permits accurate blending and has resulted in a sand of excellent char-

Some of the scales, controls and batchers in the concrete-mixing plant.

acteristics. Increased production also resulted from simultaneous processing of the two materials. Under the present system accurate predetermination of pit selection is necessary. All the screens in the plant, except the two secondary sizing screens on which the material is screened dry, are equipped with sprays for washing. Wash-water is obtained from the river by a Byron-Jackson 6-stage vertical turbine pump.

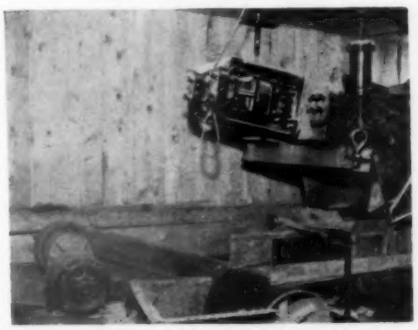
The four wooden gravel-storage bins are octagonal in cross-section and have a capacity of 2,200 tons each. The two



The sand-and-gravel plant with scalping and crushing building in foreground. Concrete-mixing plant is at left.

sand stock-piles have a total live-storage capacity of about 6,000 tons. Gates on one side of the bins allow the placing of the gravel in stock-piles to and from which it is handled by means of a Caterpillar Diesel 75 tractor equipped with a Le Tourneau bulldozer. Gates on the other side of the bins allow the discharge, on a 30-in. by 201-ft. belt-conveyor, of any sizes of which there is an excess. This conveyor discharges the excess material into a 40-cu. yd. bin from which a gate feeds it to a 4-ft. Symons cone crusher. This gate is operated by a remote-controlled Wood electric hoist. This system allows any size of gravel to be reduced to any other size. The product of this crusher is discharged on the belt-conveyor serving the jaw crusher previously described and is returned through the screening circuit.

Under the bins and stock-piles is a 30-in. by 235-ft. horizontal belt-conveyor operating in a tunnel. Sand is reclaimed from the stock-piles to this conveyor by two Traylor vibrating feeders and a single chute. Another Traylor vibrating feeder is used under the coarse-rock bin and chutes are used under the other three bins. The tunnel conveyor discharges on a 30-in. by 368-ft. inclined belt-conveyor which carries the aggregates to the concrete-mixing plant bins. All the equipment in the aggregate plant is controlled from a



Another track hopper feeder with motor-reducer drive of belt-conveyor below.

push-button board at the top of the plant.

The concrete-mixing plant has 9 aggregate bins with a total capacity of 450 tons. Cement is received in bulk in box-cars and is unloaded by a Clark power shovel into a bucket-elevator. There are three cement-storage bins with a combined capacity of 5,800 bbl. As in other government plants all batching is done automatically. The batchers are equipped with Kron scales. Mixing is done by four 4-cu. yd. T. L. Smith mixers.

Most of the equipment used in these plants is new. Exceptions are the concrete mixers which came from Boulder Dam and the belt-conveyors which came from the San Francisco-Oakland Bay Bridge plants. Other minor equipment was also brought from these projects. The new equipment includes the crushers, vibrating screens, classifiers and most of the electric motors. Pioneer conveyor belting is used exclusively in this plant. All the vibrating screens are driven through V-belts by 10-hp. motors. The cone crusher is driven by a 75-hp. motor and the jaw crusher by a 30-hp. motor. The belt-conveyors are driven through speed-reducers or motor-reducers. Conveyors No. 3 and 4 are driven by 75-hp. motors through Falk reducers. The return conveyor to the cone crusher is driven by a 30-hp. motor-reducer.

Georgia Minerals Output

Georgia is not outstanding in value of total mineral production; in 1933 it ranked 36th among the states, accounting for only ¼ of 1 per cent. of the total U. S. production. The state, however, is a leading producer of certain minerals; in 1933 it led all states in value of fullers' earth and clay, it was second in production of barite, manganiferous ores, and micaceous minerals; and third in production of bauxite.

Cement Industry Prospers with Shipments Highest in 5 Years

THE year 1936 will probably long be remembered by the cement industry as one of the most surprising "upsets" in its history. Most authorities had predicted some increase in business over 1935 but did not place much emphasis on this, probably due to the slight but discouraging decrease in production in the preceding year. In the first two months of 1936 shipments increased slightly over 1935 but in the next four months shipments climbed rapidly to a level about 50 per cent. over the 1935 figures and have maintained that lead since. That producers failed to anticipate this sharp improvement in business is evident from the fact that stocks on hand decreased steadily during the year and in October were at the lowest level in years. Present indications are that final figures for 1936 shipments will approach the 1931 figure of 125,429,071 bbl. Factory prices have been steady for several years with an average of slightly over $1.50 per bbl. compared with an average value of $1.11 per bbl. in 1931. The actual factory value of 1936 shipments will far exceed the $139,226,268 valuation placed on 1931 shipments.

Many extensive cement-plant improvement programs, which were contemplated for the winter of 1935-6, were deferred because of the poor business in 1935. The sharp upturn in 1936 served to revive these programs and many others of major and minor importance are now under way or contemplated. There is hardly a cement plant which is not being improved in some way.

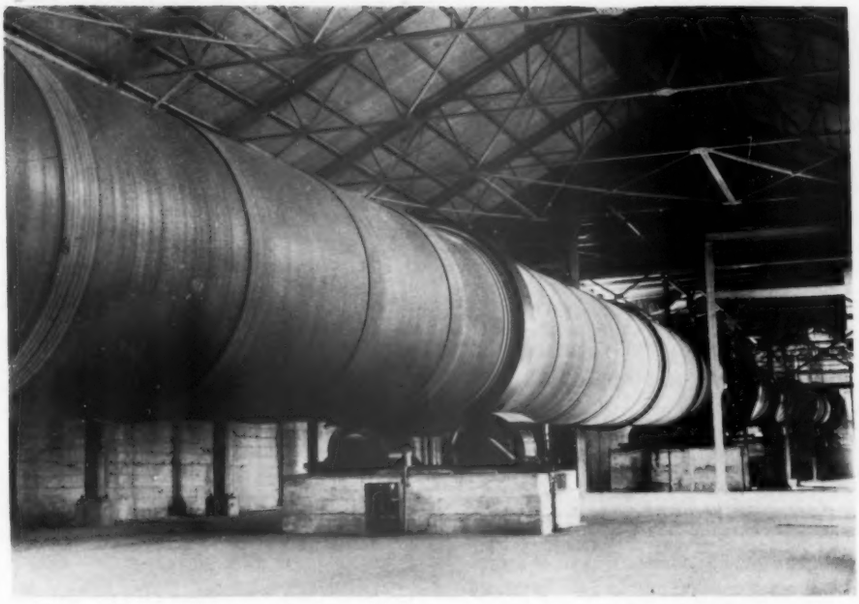
As in 1935 the productive capacity of the industry underwent little change. No new plants were built but several plants were almost completely rebuilt and several others are now going through the same process. Few of the improvements made added materially to the capacity of the industry and these were again counter-balanced by the abandonment and dismantling of other plants and equipment. Expenditures for plant improvements far exceed those in 1935, and 1937 expenditures are expected to reach the highest level in many years. Only one new plant has been publicly announced for completion in 1937 and this plant will merely serve to redistribute a part of the existing capacity as the equipment will be transferred from another plant operated by the same company. There was a notable absence during the year of the usual rumors concerning new plants.

It is significant that dry-process plants being rebuilt are converted to the wet process. Significant also is the fact that most of the plants improved during the year have replaced other systems of coal-firing with direct firing. Improvements in raw-material and clinker grinding ranked second in importance and dust-collector installations were numerous.

The most important improvement program completed during the year was that of the Canada Cement Co. at its Belleville, Ont., plant which was completely described in the October, 1936, issue of PIT AND QUARRY. This was the fifth of the eight plants operated by the company to be completely rebuilt and converted to the wet process. Complete new raw-material grinding, kiln, clay, and coal departments were also installed. Many minor improvements were made in other departments. Actual construction was begun in September, 1935, and the improved plant went into operation June 1, 1936.

As in its previous programs the im-

The plant of the Canada Cement Co. at Belleville, Ont., Can., which was rebuilt and converted to the wet process in 1936.



The 11-ft. 5-in. and 10-ft. 2-in. by 455-ft. rotary kiln installed by the Canada Cement Co.

provements made by the Canada Cement Co. centered about the new large kiln. This is an F. L. Smidth unit, 455 ft. long and 11 ft. 5 in. and 10 ft. 2 in. in diameter. All the modern control and recording instruments common to this type of kiln are used. It is equipped with a regenerative chain system at the feed end and has a Smidth Unax grate cooler, which is said to be the first installed on this continent.

Another feature of this plant is the Smidth Tirax direct-firing coal-grinding-and-drying mill. This is said to be the first time one of these mills has been applied to direct firing. The mill operates on the air-swept principle and hot air drawn from an outlet at the top of the grate cooler is introduced at the feeder. In the mill the air dries the coal in four drying cylinders. The discharge end has two grinding chambers from which the air and pulverized coal are drawn by a fan and blown into the kiln.

As in the other plants rebuilt by this company, Smidth traveling mechanical-and-air agitators are used. A 1,000-ton tank with a triple agitator is used for clay slip and a 73,000-cu.ft. basin with a quadruple agitator is used for slurry. Among other improvements is a 50,000-gal. monolithic-concrete water tank. A Babcock and Wilcox direct-firing coal mill was installed at Hull, Quebec, and another has been ordered for the company's plant at Winnipeg, Man.

The Marquette Cement Mfg. Co., which for several years has been gradually improving its plants at Oglesby, Ill., and Cape Girardeau, Mo., recently announced additional improvements to be made at the former plant during the winter. Most of these improvements will be of a nature intended to keep employed during the winter months men who would ordinarily be idle. Foremost among these improvements will be the revamping of the rotary kilns. These will be trued up and new

Electric motor and reducer drive at Belleville with auxiliary engine at right.

plate sections, new heat-resisting linings and in some cases new enlarged burning sections will be added. A spare kiln, which has not been operated since 1932, will be operated while this work is going on and a direct-firing coal-grinding-and-drying mill has been installed on this kiln. Facilities for more carefully proportioning the raw materials and for a more flexible control of clinker grinding are also to be added. Air separators will be installed.

In 1936 the Marquette company installed a large electrically-operated clay planer at this plant for removing hard clay overburden. Vibrating screens were also installed at all loading points for removing *debris* from cement loaded shipment.

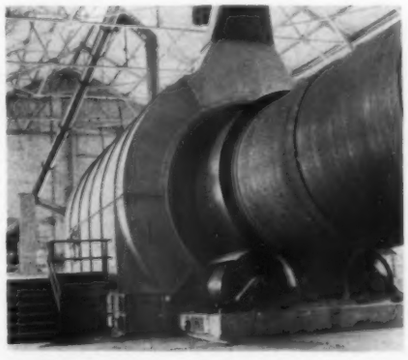
At Cape Girardeau an extensive program under way will soon be completed. Babcock & Wilcox unit coal pulverizers have been installed on all the kilns and another unit serves the rock and clay driers. A new 350-ft. concrete kiln stack has a large breeching designed to catch a large percentage of the dust in the waste gases. Screw-conveyors will reclaim this dust.

The company's commercial-stone producing facilities at Cape Girardeau have been completely rehabilitated and a production of 225 tons per hr. is now possible. Rotary screens have been replaced with the latest type Allis-Chalmers 4-ft. by 16-ft. triple-deck vibrating screens. A large stone-scrubbing plant is now under construction. At all the company's plants slow-speed inefficient electric motors are being replaced with more efficient units to reduce power requirements.

The new Mississippi plant which the Marquette Cement Mfg. Co. announced some months ago will not add to the productive capacity of the industry as the equipment involved is being transferred from one of the company's other plants.

Another important improvement program completed in 1936 was that at the Fordwick, Va., plant of the Lehigh Portland Cement Co., which was described in detail in the July, 1936, issue of PIT AND QUARRY. This company early in 1936 completed the installation of two 1,200-hp. Babcock & Wilcox waste-heat boilers, three 14-ft. Sturtevant air separators, a Sly dust-collector, many electric motors, elevators, conveyors, etc. Considerable equipment brought from other Lehigh plants was also installed. A new 275-ft. concrete kiln stack was erected by the Weber Chimney Co. and twelve 1,000-bbl. reinforced-concrete raw-material blending bins were erected. These improvements were the final steps in a program which has been under way since 1931 and has made this one of the most efficient and economical plants in the South. High-early-strength cement can now be made at this plant as a result.

The Trinity Portland Cement Co.,



The grate cooler at Belleville which is the first of its kind on this continent.

operating three plants in Texas also made important improvements during the year. At the Fort Worth plant a program begun in 1935 was completed recently. Included in this program were four new 32-ft. by 90-ft. concrete cement silos with a combined capacity of 80,000 bbl. These supplement six existing silos having a capacity of 108,000 bbl. A new pack-house for these silos contains three 4-tube packers. Other improvements included a 6-in. Morris slurry pump and four Tyler Hum-mer screens. These screens take the product of the preliminary clinker-grinding mills and return the coarse material to them. Earlier two Vanderwerp recuperators and two grate-type coolers had been installed.

One of the two 1200-hp. water tube type waste-heat boilers at Fordwick, Va.

At the Eagle Ford plant near Dallas a Bradley Hercules mill replaced 6 old mills in the finish-grinding department and 4 Hum-mer screens were installed in closed circuit. At the Houston plant a grate-type clinker cooler was installed in 1936. Minor improvements were also made at all three plants.

The Universal Atlas Cement Co. in 1936 completed extensive improvements in its plant at Waco, Tex., and plans to rebuild its plants at Hudson, N. Y., and Leeds, Ala., completely during 1937. It is expected that other of the company's plants will also be improved but no definite information is as yet available on this subject.

During 1936 the company's plant at Waco, Tex., was improved by the installation of two 14-ft. and one 16-ft. Sturtevant air-separators in the raw- and finish-grinding departments. Cement-storage silos with a capacity of 100,000 bbl. were erected by the Jones-Hettelsater Const. Co. Movable Fuller-Kinyon pumps reclaim the cement from storage and a new packing plant has been added. At Independence, Kan., the Burrell Engineering & Construction Co. erected cement-storage silos of 125,000-bbl. capacity.

The Allentown Portland Cement Co., Evansville, Pa., installed a 16-ft. Sturtevant separator and is adding two 7-ft. by 46-ft. F. L. Smidth tube-mills in the clinker-grinding department. These mills are to be driven by 900-hp. synchronous motors through gear-reducers.

The Ash Grove Lime & Portland Cement Co. installed four Babcock and Wilcox pulverizers at its Chanute, Kan., plant. A new cooler was also added and a Northern Blower Co. dust-collector was installed in the packing department.

The Bessemer Limestone & Cement Co. at Bessemer, Pa., in addition to its new commercial crushed-stone plant described elsewhere in this issue in the review of that industry, also continued making improvements to its cement plant. In 1935 a new conveyor system to the raw-material storage was built and the storage enlarged. Two Vanderwerp recuperators were installed on the kilns. This year a Norblo dust-collector was installed in the finish-grinding department, a Raymond direct-firing bowl mill on one of the kilns and many other improvements were made. A second Raymond bowl mill is now being installed.

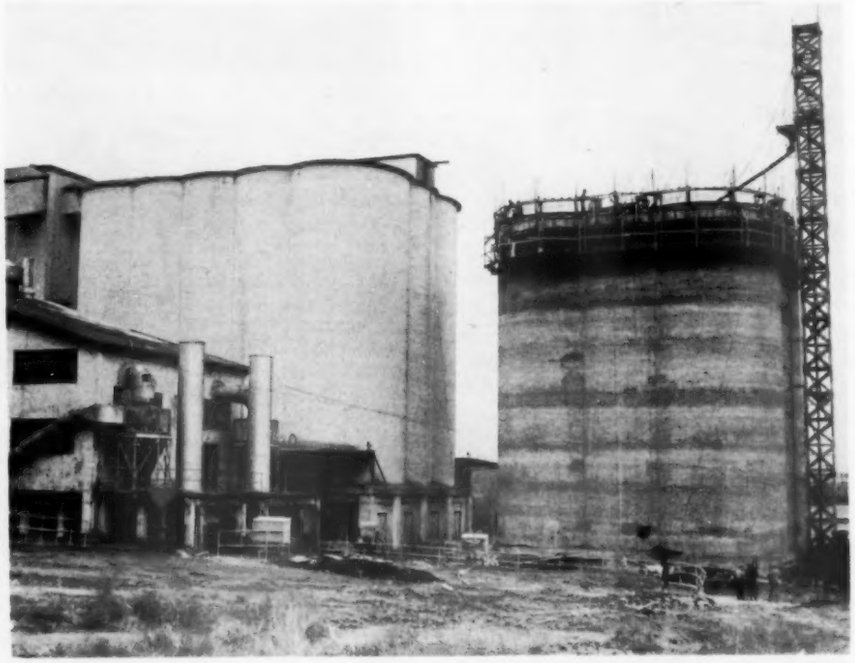
The British Columbia Cement Co., Ltd., is spending $50,000 on an aqueduct and four dams to supply water for its operations.

The Calaveras Cement Co., San Andreas, Cal., made a number of changes for the production of white cement. A new crusher building with an Allis-Chalmers gyratory crusher was built, and pumping and packing equipment was installed. The MacDonald Engineering Co. had charge of the construction. Recently a contract was awarded to the Western Precipitation Co. for a Cottrell electric precipitator. Late in 1935 a Lee Process clinker cooler was installed at this plant.

Plant and new stack of the Lehigh Portland Cement Co. at Fordwick, Va.

The California Portland Cement Co., Colton, Cal., continued the improvement program begun in 1935, when two Allis-Chalmers raw-grinding mills were installed and the old compressors were replaced with Fuller rotary compressors located at the point of air utilization. In 1936 Fuller-Kinyon cement-pumping equipment was installed and six 26-ft. by 80-ft. cement silos were erected by the MacDonald Engineering Co. A Norblo dust-collector is now being added.

The Cowell Portland Cement Co., Cowell, Cal., installed a Western Precipitation Co. Cottrell electric precipitator, and a 235-ft. concrete kiln stack was built by the Rust Engineering Co. This installation was described in the



The new 80,000-bbl. silos of Trinity Portland Cement Co. at Fort Worth, Texas, near completion. The two grate-type coolers are shown at left.

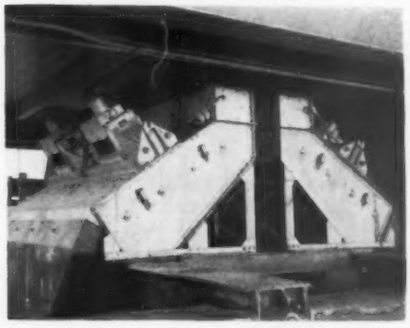
July, 1936, issue of PIT AND QUARRY.

The Columbia Cement Div. of the Pittsburgh Plate Glass Co. has ordered two Babcock & Wilcox direct-firing coal mills for its plant at East Fultonham, O.

The Dewey Portland Cement Co. installed a Raymond direct-firing bowl mill and a Vanderwerp recuperator and made other improvements at Dewey, Okla. At Davenport, Ia., three Babcock & Wilcox direct-firing mills were installed. This plant recently ordered twelve 195-ft. by 35-ft. all-welded steel barges from the St. Louis Shipbuilding and Steel Co. These barges will be used for cement delivery and to bring coal to the plant.

The Diamond Portland Cement Co., Middlebranch, O., is installing Vanderwerp recuperators on its two 10-ft. by 150-ft. dry-process kilns. Norblo exhaust fans are being added.

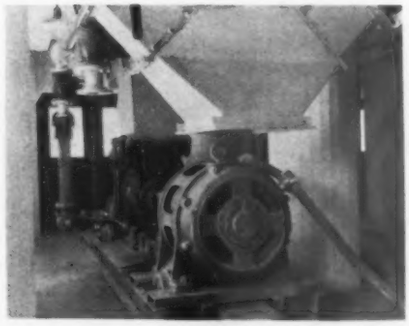
The Hawkeye Portland Cement Co., Des Moines, Ia., purchased 10 Morris slurry pumps for an important improvement program now in progress.



The four new screens in the finish-grinding department of Trinity's Fort Worth plant.

The Huron Portland Cement Co. added 6 new cement-storage silos with a capacity of 50,000 bbl. These were built by the Burrell Engineering Co. A Norblo dust-collecting system was installed in the company's pack-house at Cleveland, O. A Raymond bowl mill was installed at Alpena, Mich., and 5 more machines have been ordered.

The Idaho Portland Cement Co., Inkom, Idaho, continued a series of improvements begun in 1935. A Schaffer Poidometer and 5 Manitowoc Minogue slurry agitators were installed in 1936.



One of the movable cement pumps under the new silos of Universal-Atlas's Waco plant.

At left are the new reinforced-concrete cement-storage silos of the Universal-Atlas Cement Co. plant at Waco, Tex.

The Kosmos Portland Cement Co., Kosmosdale, Ky., in 1936 further improved the washing plant at its quarry by the installation of a 4-ft. by 14-ft. Allis-Chalmers double-deck vibrating screen. The cement-plant improvements include a 315-ft. concrete kiln stack and a dust-collecting system for the raw-grinding department. Four Vanderwerp recuperators are now being installed on four 7-ft. by 100-ft. dry-process kilns and other improvements are under way.

The Lone Star Cement Corp., formerly the International Cement Corp., New York, has a new plant under construction at Parana, Argentina, which will include a flotation system. Extensive improvements to its plants in the United States are either completed or under way. Summaries of some of these follow:

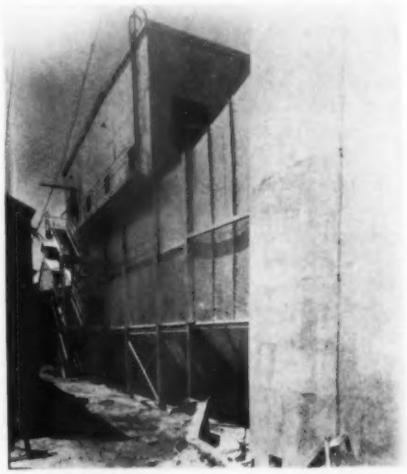
The Lone Star Cement Corp., Alabama Division, installed a second Babcock & Wilcox direct-firing pulverizer in its Birmingham plant.

The Lone Star Cement Corp., New York Division, added two 16-ft. Bradley air-separators to the finish-grinding department in its Hudson, N. Y., plant.

The Lone Star Cement Corp., Pennsylvania Division, early in the year installed three Babcock & Wilcox pulverizers and a Traylor kiln at Nazareth, Pa. This followed the completion of new crusher and rock-storage buildings late in 1935. Improvements involving the expenditure of $75,000 are now under way.

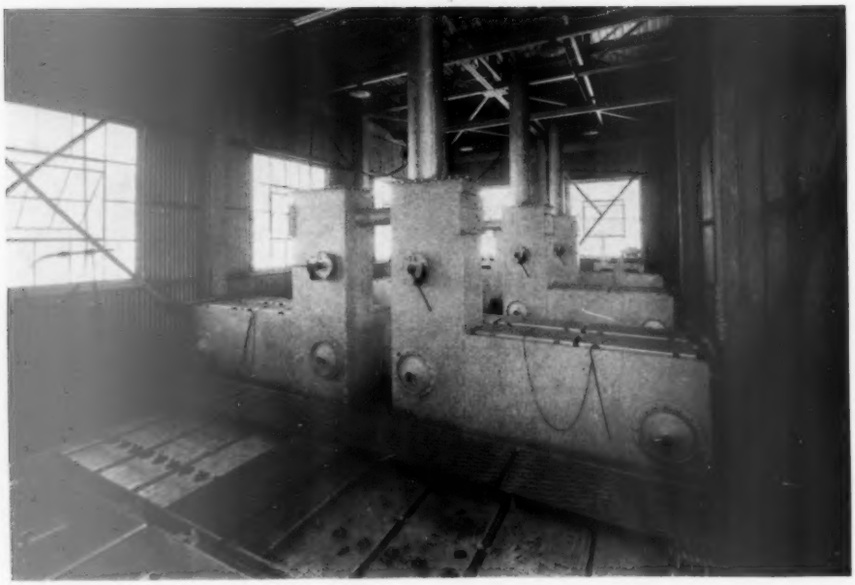
The Lone Star Cement Corp., Texas Division, in 1936 installed two 8-ft. by 40-ft. Allis-Chalmers Compeb mills in its finish-grinding department at Houston, Tex. Each mill has a new 16-ft. separator in closed circuit, gypsum and clinker bins and feeders were also installed. A dust-collector serves these mills and the elevator and screw-conveyors operated in connection with them.

The Louisville Cement Co., Speed, Ind., installed four Richardson Convey-o-Weighs and Norblo dust-collecting systems in the raw- and finish-grinding departments. A contract was also let for an addition to the mill building to house grinding-department improvements including a Raymond air-separator.



The new electric precipitator at the plant of the Cowell Portland Cement Co.

Two Vanderwerp recuperators were installed in the Wampum, Pa., plant of the Medusa Portland Cement Co. Later a rotary cooler with a capacity of 4,000 bbl. daily was added. Two 16-ft. Sturtevant separators have been installed in the raw-grinding department to be operated in closed circuit with tube-mills.



The operating room of the new precipitator installed by the Cowell Portland Cement Co. at Cowell, Cal.

The Missouri Portland Cement Co. installed a Norblo dust-collector at one of its plants and made other improvements.

The Monolith Portland Cement Co., Monolith, Cal., late in 1935 began an improvement program which when completed will make this one of the most modern plants in existence. Already installed are new F. L. Smidth Kominuters, Tyler Hum-mer screens, and a new crane in the storage department. F. L. Smidth & Co. are furnishing the equipment and doing all the engineering work.

The North American Cement Corp. added new cement-storage silos at Alsen, N. Y. These were built by the Nicholson Co.

The Olympic Portland Cement Co., Bellingham, Wash., installed a Sly dust-collector in its pack-house. Three Babcock & Wilcox direct-firing coal mills are now being added.

The Peerless Cement Corp., Detroit, Mich., in 1936 installed a 3,750-kv.-a. General Electric turbo-generator which supplemented a similar unit installed in 1935. Three Babcock & Wilcox direct-firing coal mills were installed on kilns and a fourth on an auxiliary boiler.

The Pennsylvania-Dixie Cement Corp. installed two Babcock & Wilcox mills at Des Moines, Ia. At Richard City, Tenn., four Jeffrey-Traylor electric vibrating screens and two Sturtevant air-separators were added.

The Petoskey Portland Cement Co., Petoskey, Mich., completed a $100,000 improvement program for the manufacture of high-early-strength and special cements. Three sets of Northern Blower Co. dust-collectors were installed.

The Republic Portland Cement Co., Longhorn, Tex., in 1936 installed a 16-ft. Sturtevant separator in its finish-grinding department. F. L. Smidth spray casings were also added to each of the two 7-ft. by 40-ft. finish mills. A 70-ft. extension of the clinker storage is also in progress.

The San Antonio Portland Cement Co., San Antonio, Tex., has for several years been carrying on an improvement program which was completed late in 1936. Among the most recent additions to this plant was an 8-ft. by 50-ft. four-compartment Traylor finish-grinding mill of a new type with a center discharge. This is driven by a 1,250-hp. General Electric motor of a new type. A 2,000-hp. Rathbun-Jones Diesel engine was added to the company's power-generating plant to take care of additional loads. A third Lee Process clinker cooler and a Norblo dust-collector were also installed. An extensive improvement program now under way is said to include a shop for the production of special cast-concrete units for oil-well casings.

The Signal Mountain Portland Cement Co., near Chattanooga, Tenn., completed an improvement program which included the installation of two Babcock & Wilcox pulverizers.

The Spokane Portland Cement Co., Irvin, Wash., which in 1935 installed the first Lepol kiln in this country, in 1936 installed a Babcock & Wilcox direct-firing coal mill and a 12-ft. Sturtevant air-separator to fire this kiln. Another Babcock & Wilcox mill is being installed in the raw-grinding department.

The Three Forks Portland Cement Co., Trident, Mont., continued its improvement program with the installation of Babcock & Wilcox direct-firing coal mills.

The Washington-Idaho Lime Products Co., Orofino, Idaho, made improvements costing about $100,000 to its cement plant which was built in 1935. The new equipment includes a ⅜-cu.yd. Byers Bearcat shovel, Telsmith crushers and vibrating screens, a Colorado Iron Works tube-mill and a ball mill, an International tractor and Tyler Hummer screens. The finish-grinding capacity has been doubled.

The Whitehall Cement Mfg. Co., Cementon, Pa., one of the first to install a Babcock & Wilcox ball-bearing pulverizer, in 1936 added two more of these units to its clinker-grinding department.

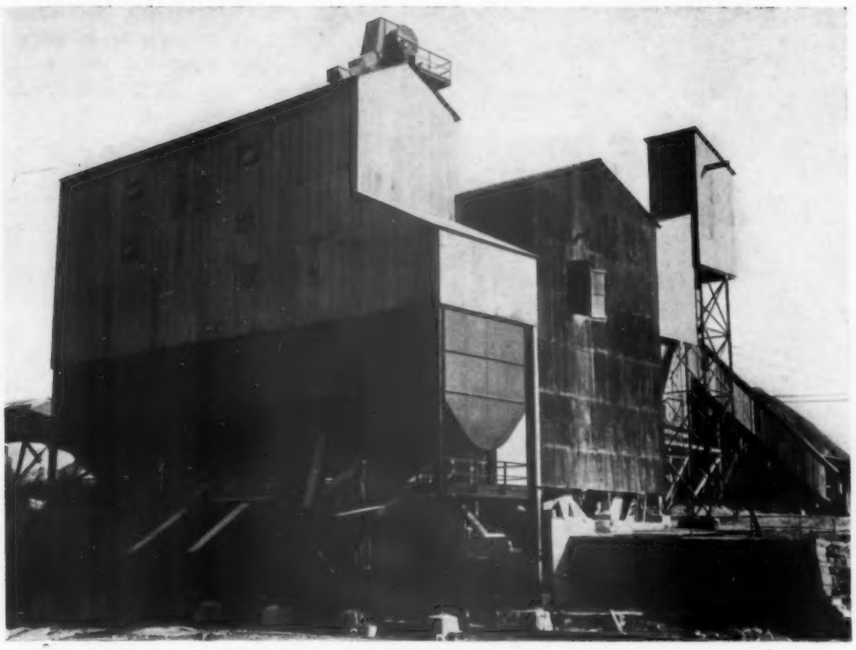
The Yosemite Portland Cement Co., Merced, Cal., expended $60,000 on repairs and improvements.

Negotiating to Control European Cement Output

According to *Mineral Trade Notes*, published by the U. S. Bureau of Mines, negotiations are proceeding between the Belgian cement cartel and the English, Danish, German, and Yugoslav producers to control European production and sales, and should these negotiations be successful the new association will seek to reach an agreement with American producers. The Belgian cartel of Portland-cement manufacturers created July 1, 1935, is now supervising virtually all of Belgium's cement industry, including slag and iron cement manufactures, as well as limestone quarries and pits.

In the third quarter of 1936, the Belgian cement industry continued to receive a large volume of orders in the domestic as well as foreign markets. According to information received, the Portland-cement manufacturers already have contracted for over 200,000 tons for future government public works. Prices named in the contracts are those that prevailed when the contracts were signed, which means that recent increases will not affect them. An underground station in Brussels will use about 16,000 tons of cement, and the construction of 400 kilometers of autostrade soon will offer an outlet for the cement industry. Cement sold by the Belgian cartel for military purposes since July 1, 1935, is given at 50,000 tons.

Since September 1, 1936, prices for the domestic market to dealers have increased by 5 francs per ton in bulk and 7 francs per ton in paper bags. A further increase of 10 francs per ton is contemplated as of April 1, 1937. It should be noted that, in their negotiations with the government, the cement cartel's representatives insisted upon being permitted to increase their prices by 10 francs per ton, but the government considered such an increase unjustified.



The new commercial crushed-stone washing and screening plant of the Bessemer Limestone & Cement Co.

The hammer-mill used for production of cement rock at Bessemer.

Aggregates Output Stimulated by Renewed Building Activity

THE sand-and-gravel, crushed-stone and slag industries in 1936 continued at an accelerated rate the upward trend of production begun late in 1933 and indications are that the increased demand will continue unabated in 1937. In 1935 the output was slightly over that of 1933 but the final 1936 figures should show at least a 35-per cent. increase over 1935 judging from incomplete government reports and other indicators. From present indications a similar increase in 1937 can be expected. As in 1935 most of this increase in demand went to the sand-and-gravel industry because of the unusually large amount of low-type road construction carried on in sections where only sand and gravel are available. The relatively slight increase in railroad-ballast purchases also had some effect.

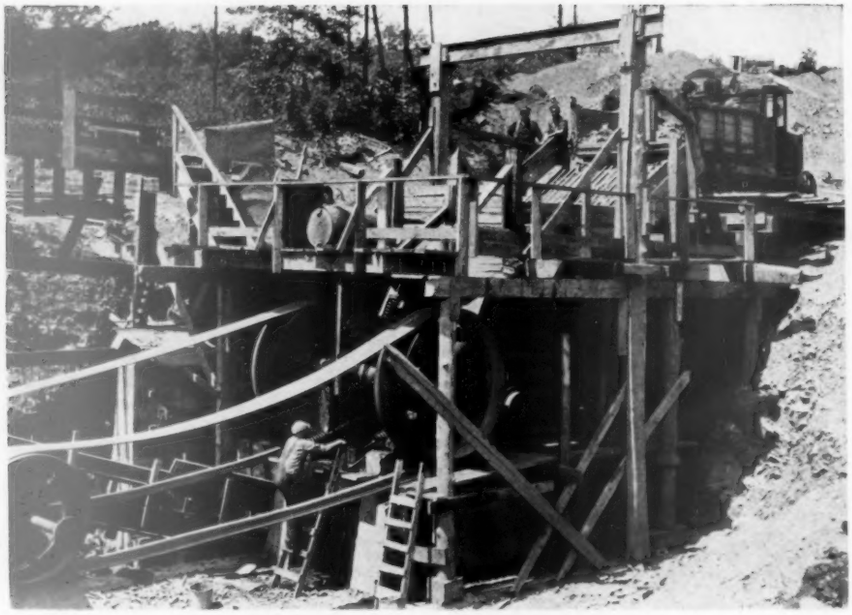
The fact that prices received for this material on the average remained almost stationary made this the most profitable year since the depression for these industries in spite of the fact that not more than half the existing plant capacity was utilized. This condition was responsible for a buying wave reminiscent of the years before 1930. Many new plants were built during the year and innumerable plants were improved to enable them to meet present demands both for quality and quantity. It is significant that most of the new plants built are of small or medium size and are designed to serve a comparatively small area.

Probably the outstanding new commercial crushed-stone plant of the year was that of the Bessemer Limestone & Cement Co. at Bessemer, Lawrence County, Pa. This new washing-and-screening plant supplements a preliminary crushing-and-screening plant built in 1935 for the production of cement rock and flux. Both plants are so designed that the products can be varied to meet any combination of demands. When only cement rock and flux are produced a capacity of 250 tons per hr. is possible. For commercial crushed stone the capacity is 150 tons per hr.

The equipment installed in the preliminary plant included a Dixie hammer-mill, a Symons cone crusher, an Allis-Chalmers gyratory crusher and two Allis-Chalmers vibrating screens. That in the newer plant includes two Allis-Chalmers Low-Head screens, a Webster rotary scrubber, a Webster double-screw washer and conveyors and elevators of the same make. Both plants were completely described in the December, 1936, issue of PIT AND QUARRY.

An interesting new plant was built by the Arborio Road Construction Co. near Hartford, Conn. Although intended primarily to supply aggregate for the company's highway contracts, all the production in excess of its own needs is being marketed. This plant, which has a capacity of 100 tons per hr., went into operation August, 1936, and was completely described in the December, 1936, issue of PIT AND QUARRY.

Linn tractor-trucks haul the stone from the quarry to the Acme primary crusher. The preliminary sizing is done on a Kennedy-Van Saun triple-deck vibrating screen and the recrushing by a gyratory crusher of the same make. Another Kennedy screen produces fine sizes of rock. All the handling of



Truck discharging to primary crusher at plant of Arborio Road Construction Co. Conveyor and secondary crusher are in left background.

materials in this plant is done by belt-conveyors. Rock can be loaded out direct or can be batched out with or without cement, all the shipping being done by truck. A 300-hp. Fairbanks-Morse semi-Diesel engine provides power for all the operations.

The new plant of the Louisville Crushed Stone Co., Louisville, Ky., described in the July, 1936, issue of PIT AND QUARRY, also incorporates many interesting features. This plant has a capacity of 90 tons per hr. and depends mainly on truck shipments to the Louisville metropolitan area for disposal of its products. Of particular interest to producers is the use of a 12-cu.yd. Le Tourneau scraper drawn by a Caterpillar tractor for removing the overburden. Simplicity of design and minimum handling of materials are features of the plant. Trucks discharge the quarried rock from an earthen ramp into a Traylor jaw crusher whose product drops into a gyratory crusher of the same make. An elevator feeds a series of two Robins Gyrex screens, the last one being equipped with sprays for washing. Oversize material can be returned to the secondary crusher. A third and smaller screen can be used to produce special sizes.

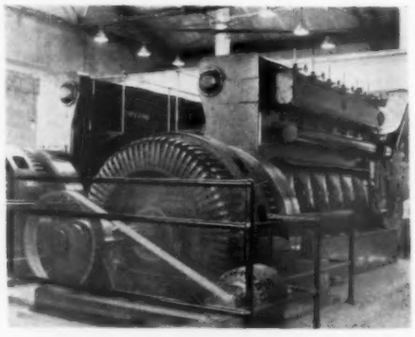
The water-supply system at this plant is unusual. As the creek which supplies water for the plant often runs dry during the busy summer season a method of insuring a year-round supply was needed. A 600-ft. canal was dug from the creek to a point near the plant where the pump-house was located. As the canal is considerably deeper than the creek it remains full even when the creek level drops.

Chickamauga Dam is the Tennessee Valley Authority's latest construction project on the Tennessee River. The site of the dam is 7 mi. upstream from Chattanooga. In general design it will consist of a concrete section, made up of lock, spillway and power-house, across the main channel of the stream, flanked on either side by earth embankments extending to high ground. The dam will have an overall length of 5,800 ft., of which the north dike will be 1,410 ft. long and the south embankment 2,870 ft. The production of aggregates for concrete was recently begun.

The major part of the aggregates for the concrete on this job comes from a quarry 6,000 ft. from the dam site. About 3,000 tons of rock is blasted from the quarry daily, transferred to 12-cu.yd. trucks by two power shovels and carried to an Allis-Chalmers 42-in. gyratory primary crusher. A 36-in. belt-conveyor carries the crushed stone from the primary crusher across North Chickamauga Creek to a Symons secondary cone crusher. A 30-in. belt-conveyor carries the material to four screening units which take out cobbles—6- to 3-in. coarse rock, 3- to 1½-in. medium rock, 1½- to ¾-in. rock, and fine rock ¾- to ¼-in. The sizes of stone drop to stock-piles under which is a wooden reclaiming tunnel with gates in the roof. A 30-in. belt-conveyor within the tunnel carries the material to a steel loading hopper located over standard-gage railroad track. From this track-hopper the aggregate is carried about 5,000 ft. in quarry cars drawn by Plymouth gasoline locomotives to an unloading pit near the concrete-mixing plant on the north bank at the side of the navigation lock.

Sand and cement for the concrete are shipped by railway to the job. The cement is stored in an elevated steel silo alongside the mixing plant, while the sand is stored in a stock-pile adjacent to the unloading pit. An 8-ton skid rig transfers the sand from the stock-pile to the unloading pit, which discharges hopper-fashion on another belt-conveyor

The new plant of the Arborio Road Construction Co. with power house at left and batching plants in foreground.



The two new Diesel-generator sets at the plant of the Columbia Quarry Co., Krause, Ill.

that carries the material to the bins in the top of the concrete-mixing plant. From these bins the aggregate travels by gravity through the batching equipment down to two 2-cu.yd. Davis tilting mixers.

A 36-in. belt-conveyor carries the concrete from the mixing plant to a hopper within the navigation-lock chamber. Three-cu.yd. Dravo concrete buckets on standard-gage flat cars are loaded by gravity from the hopper and are drawn by gasoline locomotives to points within reach of an American revolver crane which transfers the buckets to the forms.

At present about 50,000 cu.yd., or 25 per cent. of the required amount of concrete has been placed in the navigation-lock forms.

New crushed-stone plants were also built by the following: Kankakee Stone Co., Kankakee, Ill.; Silverdale Quarry Co., Silverdale, Kans.; Herbert Gingell, Gettysburg, Pa.; L. Romano Engineering Corp., Riverton, Wash.

The Columbia Quarry Co., in July, 1936, installed a Diesel-generating plant to supply power for its operations at Krause, Ill. Two 4-cycle mechanical-injection type National Superior Diesel engines drive two Allis-Chalmers a.-c. generators. The 8-cyl. engine is rated at 525 hp. and the 6-cyl. engine at 400 hp. Both engines are operated under normal load requirements, but either can also be operated alone to meet any conditions. A 22-hp. Superior Diesel engine drives a lighting generator which can also supply power for operation of the machine-shop equipment when the large engines are idle.

The W. C. Busick Quarries, Osceola, Ia., in 1936 improved their operations by installing a Gruendler 24-in. hammer-mill and a 100-hp. Climax gasoline engine to drive it.

Tractor and scraper removing overburden from property of Louisville Crushed Stone Co. The new plant is in the background.

The East St. Louis Stone Co., East St. Louis, Ill., in 1936 improved its plant by the installation of a 3-deck Symons screen. Railway haulage in the quarry was abandoned and five 6-cu.yd. Hug trucks are now used. Later in the year a Marion 490 electric shovel was purchased. Two 4-cu.yd. Hug trucks were also purchased to haul away overburden.

The France Stone Co. in 1936 further expanded its productive facilities through the acquisition of a number of plants. One of these was the Sherburn Quarry, near Convoy, O., which had been improved by the installation of a Deister Plat-O screen. The France Company plans further improvements.

The Inland Lime & Stone Co., Port Inland, Mich., completed an extensive program of enlargement begun in 1935. Storage capacity was increased and screening and conveying equipment was added.

The LeRoy Lime & Crushed Stone Co., LeRoy, N. Y., installed Norblo dust collectors in its stone-crushing and drying departments. The New York Trap Rock Corp. made several Norblo installations in its plants.

The Southwest Stone Co. installed an American ring-roll pulverizer at its Chico, Tex. plant. The W. W. Vann Construction Co. installed primary and secondary McLanahan & Stone crushers at Marfa, Texas.

The Utah Sand & Gravel Products Corp., Salt Lake City, Utah, in 1936 built a new gravel-ballast plant at Sand Pass, Nev., on the Western Pacific Railroad right-of-way. With the exception of the crushers and power units the plant was entirely of Stephens-Adamson manufacture.

In the pit a Northwest 1½-cu.yd. shovel with a 100-hp. Caterpillar Diesel engine loads the excavated material into International 5-cu.yd. dump trucks. Usually two trucks are used, dumping on a 12-in. rail grizzly through which the oversize material is sledged. A reciprocating feeder discharges on a 30-in. belt-conveyor which discharges on a 4-in. bar grizzly. The oversize material goes to a 15-in. by 28-in. Alloy Steel & Metals jaw crusher, whose product, with the material passing through the grizzly, is carried on a 24-in. conveyor to a 4-ft. by 9-ft. 6-in. double-deck vibrating screen. The oversize material goes to a 9-in. by 38-in. A. S. & M. jaw crusher and is returned by a 20-in. conveyor to the screen conveyor. The material retained on the second deck, ¼-in. to 2-in., is carried on a 24-in. conveyor to the bins. The fines, or sand, go to a 20-in. belt-conveyor to the storage bins. This conveyor can discharge on a second 20-in. conveyor for additional storage in stock-piles. This storage conveyor is in 20-ft. sections and can be added to as the storage pile is built up. Shipments are made by railway and cars are loaded through spouts on two sides of the bins.

Two D-1300 Caterpillar 100-hp. Diesel engines supply ample power to operate the plant. A D-4400 Caterpillar

Electric shovels loading trucks in the T.V.A. quarry which supplies crushed-stone plant at Chickamauga Dam.

15-hp. Diesel engine drives a generator which supplies light for night operation of the plant, for the camp, etc. Usually nine men per shift, including the superintendent, were sufficient to operate the plant. The plant capacity is about 125-cu.yd. per hr. of finished ballast, in addition to about 60 cu.yd. of fines which are wasted.

Construction on the Guntersville Dam was authorized by the T.V.A. board of Nov. 27, 1935 and production of aggregates for the concrete began in the summer of 1936. The project is located

The T.V.A. plant which is supplying crushed stone for the construction of Chickamauga Dam.

10 mi. downstream on the Tennessee River from Guntersville, Ala. When completed, the dam will be made up of a concrete section including navigation lock, spillway, and power-house, across the main channel of the stream, flanked on either side of the river by earth embankments extending to high ground. The dam will have an overall length of 4,000 ft. of which the north embankment will be approximately 705 ft. long and the south dike about 1,860 ft.

The authority has contracted for aggregates for the concrete on this project, and they are dredged from the river a short distance from the site and sent by barge to the dam.

An American revolver crane transfers the material from the barges into an unloading hopper which discharges on a 30-in. belt-conveyor. This conveyor carries the material 450-ft. to a new type of radial stacker made up of a 110-ft. guyed mast carrying a 160-ft. especially-designed stacker which distributes the material into five separate compartments. When necessary to reclaim material from the stock-piles, the belt on the stacker-boom can be reversed in operation. A 1½-cu.yd. crawler crane transfers the material with a clam-shell bucket to the hopper at the extreme end of the stacker-boom. The material is discharged into another hopper at the base of the mast, which in turn discharges it on another belt-conveyor to be carried away to a live-storage point made up of five timber bins. When possible, material is usually routed directly to the live-storage bins without being stacked in the main storage piles. From the live-storage bins another belt-conveyor carries the material to the bins at the top of the concrete-mixing plant. The aggregates from this point are carried by gravity down through the batchers and into 2-cu.yd. Ransome mixers. Cement for the concrete is shipped in by railway and stored in an elevated steel hopper situated alongside the mixing plant. The concrete is conveyed from the mixing plant to the navigation-lock chamber on another 36-in. belt, discharging

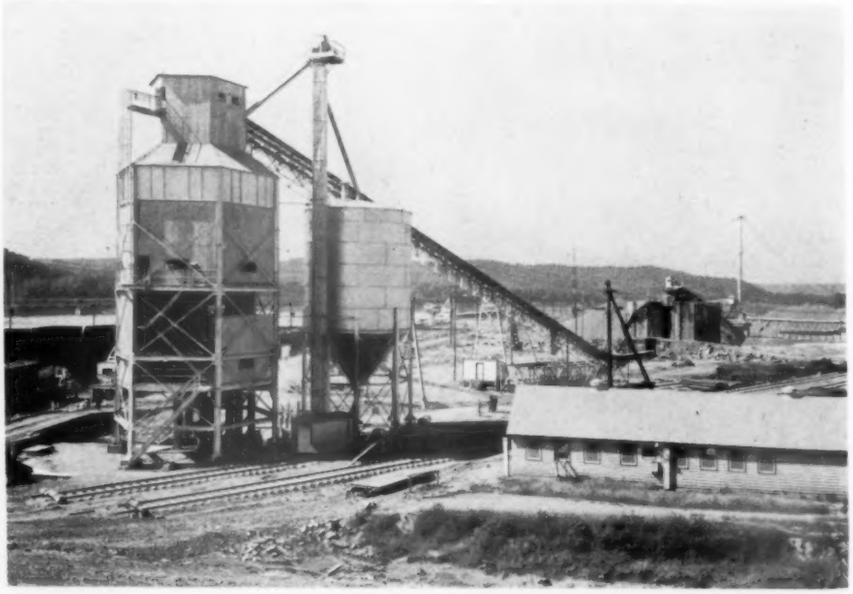
The new gravel ballast plant of the Utah Sand & Gravel Products Corp.

into a two-compartment hopper. Two-cu.yd. buckets, two to a truck, are loaded from the hopper and carried within reach of several Wiley Whirleys operating on gantries through the length of the lock chamber.

At present 85,000 out of the required 122,000 cu.yd. of concrete has been placed on the lock.

The T.V.A. plant at Pickwick Landing Dam, which was completely described in the June, 1936 issue of PIT AND QUARRY is also not a producing plant but is an unusually interesting storage plant. Sand and gravel are produced under contract by a privately-owned river dredge and are delivered to the storage plant in barges. Unloading is done by a Clyde stiff-leg derrick operating a 2-cu.yd. clam-shell bucket and an American Hoist & Derrick Co. whirley also handling a 2-cu.yd. bucket.

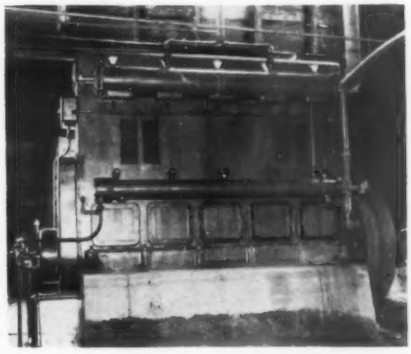
A Jeffrey-Traylor vibrating feeder provides a steady flow of material from the shore hopper to a belt-conveyor feeding the Kern radial-storage system. This storage has six radial compartments each with a live-storage capacity of 500 tons. A 2½-cu.yd. Sauerman Crescent scraper is used to handle the



Concrete-mixing plant and cement silo of T.V.A. at Guntersville Dam. Sand and gravel storage bins are in background.

Aggregate-storage plant of the T.V.A. at Guntersville Dam, Ala. In the center is the radial stacker and in the foreground is the conveyor to the concrete-mixing plant.

material to and from dead storage, which has a total capacity of about 250,000 tons. The scraper is operated from a head tower mounted on rails encircling the storage system. The coarse aggregates and sand are discharged from storage on a series of four belt-conveyors which total 1,500-ft. in length



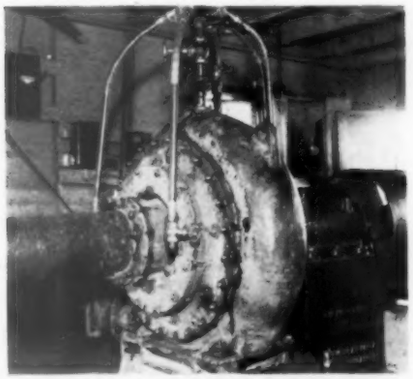
The Diesel engine on the dredge of the Tecumseh Gravel Co.

and discharge into the concrete-mixing-plant bins.

A number of new plants were built in Mississippi during the year to supply aggregates for the State's highway program which is now well under way. Most of these plants are small and are designed so that they can be taken down and moved to new locations but are not strictly portable. Brief descriptions of some of the most interesting of these plants follow.

The Myles Gravel Co. of Jackson, Miss., operates two plants of the same general design. The newest plant is at Utica, Miss., where the company works a 14-acre bar of high-grade sand and gravel in White Oak Creek. The dredging equipment consists of an 8-in. Georgia Iron Works pump driven by a 150-hp. Minneapolis-Moline gasoline engine. The dredge line discharges into a Lockett trash remover at the plant. Sizing is done on a Universal double-deck vibrating screen. The other plant at Myles Station is similar to this but its dredge pump is driven by a Caterpillar Diesel engine.

The Radcliff Gravel Co., Inc., operator of a large permanent plant at Mobile, Ala., in September started up a plant near Charleston, Miss., for a road



The 8-in. counterflow dredge pump installed by Kivett & Reel at Sun, La.

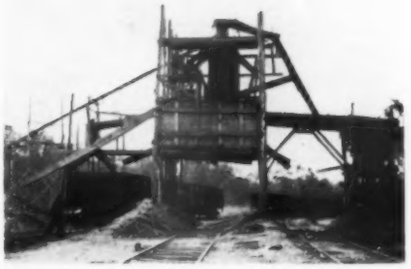
contract. The dredge has an 8-in. Morris pump driven by a 120-hp. Fairbanks-Morse Diesel engine. This engine also drives a generator which supplies power for the plant. Stationary screens remove the sand to classifying cones and a dewatering box. A Tyler Niagara screen sizes the gravel. Individual conveyors carry each size to storage. Shipments are made by truck.

The Highway Hi-Test Sand & Gravel Co. recently completed a new plant at Hermanville, Miss. On the dredge the 8-in. Kansas City Hay Press Co. pump is driven by a 130-hp. Hercules gasoline egine. Sizing is done by a 3-deck Pioneer counter-balanced shaker screen.

The Hartland-Verona Gravel Co., Verona, Wis., installed an all-steel portable plant made by the Lippman Engineering Co. Equipment includes a 14-in. by 40-in. primary jaw crusher, a 42-in. by 24-in. roll reduction crusher, a vibrating screen, and belt-conveyors. A new No. 150 P & H ½-cu.yd. gasoline shovel is used in the pit.

The Pioneer Sand & Gravel Co. early in 1936 began the construction of two large sand-and-gravel washing plants on Puget Sound at Steilacoom, Wash.

A. D. McKee, Inc., dismantled a plant at Hohokus, N. J., and now has under construction a new plant at Maway. Its capacity will be about 100 tons per hr. and Diesel-generated power will be used.



The new plant of the Myles Gravel Co. at Utica, Miss., with trash remover at top.

The Umpqua River Navigation Co., Reedsport, Ore., in March, 1936 built a plant which produced 30,000 cu.yd. of sand and gravel per month. A 6-cyl. 140-hp. Atlas Diesel engine operates it. The equipment includes an 8-in. by 36-in. jaw crusher, a 36-in. Telsmith Gyrasphere crusher, and a set of 40-in. rolls.

The Western Sand & Gravel Co., Spring Valley, Ill., installed a Kern radial storage system at its plant at that location. Screening and classifying equipment was added and trucks replaced railway haulage in the pit.

The plant of the Keystone Gravel Co., Dayton, O., on July 13, 1936 was almost completely destroyed by fire at a loss of about $75,000. Only the concrete bins remained undamaged. The former wooden superstructure was replaced with one of steel and new equipment was installed, the latter including four new Simplicity vibrating screens, one 3-deck 4-ft. by 8-ft., two 2-deck and a 1-deck sand screen, a 28-in. by 20-in. Greenville roll crusher, a steel sand-settling tank, bucket-elevators, belt-conveyors, etc. The plant capacity is now about 300 tons per hr.

The plant of the Highway Hi-Test Sand & Gravel Co. under construction with screen at right.

The plant of the Ohio Gravel Co. at Cleves, O., burned down July 11, 1936. It was decided to salvage anything not damaged and to rebuild the plant at a new location 1¼ mi. from the old site. Actual clearing of the new site was begun July 15, the pouring of the concrete began July 20 and the new plant started in operation Oct. 10. On its second day of operation 1,943 tons was produced operating at low speed and a top capacity of 2,500 tons is expected. Three crushers and four vibrating screens were salvaged. The new equipment includes two Morrow sand-drags, and a number of motors and speed-reducers.

The remarkable flexibility of this plant allows the production of any desired sizes of sand and gravel and any sizes over 1-in. can be recrushed to produce the 100-per cent. crushed material recently specified in Ohio. Material can be loaded out in separate sizes or in any desired blend of crushed or uncrushed sizes. A new 3-ft. by 6-ft. Allis-Chalmers Low-Head screen is used to give the material loaded out a final rinse. The efficiency of the new plant is evident from the fact that only 13 men are required to operate it at capacity compared to 30 men at the old plant.

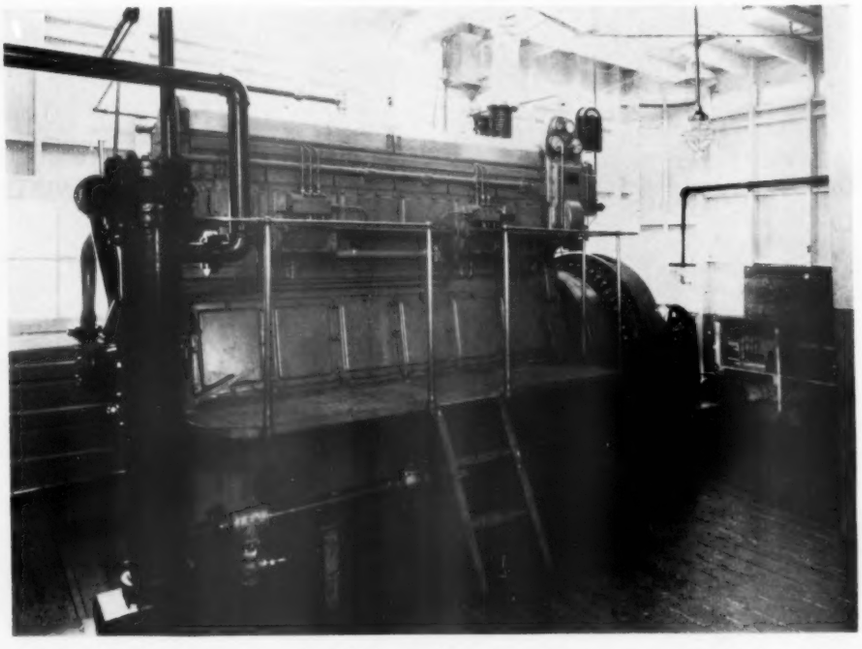
The new plant of the Radcliff Gravel Co. near Charleston, Miss.

The Marble Cliff Quarries Co., Columbus, O., in 1936 increased the capacity of its Plant B. Nine Robins vibrating screens replaced 26 rotary and vibrating screens. All the old equipment was scrapped as the company does not believe in flooding the market with used equipment. The plant capacity is now about 400 tons per hr.

The Erie Sand & Gravel Co., Erie, Pa., improved its plant by the installation of a 3-ft. by 8-ft. Kennedy-Van Saun vibrating scalping screen, a Kennedy No. 25 gearless gyratory crusher, and a McLanahan & Stone 36-in. by 24-in. secondary roll crusher. Late in 1935 two McLanahan vibrating screens were installed.

The new plant of the Ohio Gravel Co. at Cleves, O., which replaces plant destroyed by fire.

New sand-and-gravel plants were also completed in 1936 by the following: Allen Gravel Co., Iuka, Miss.; Amory Concrete Gravel Co., Amory, Miss.; Blue Diamond Corp., Los Angeles, Cal.; Gifford-Hill & Co., Turkey Creek, La.; Glacier Sand & Gravel Co., Minneapolis, Minn.; Kerstens Sand & Gravel Co., McComb, Miss.; Kingston Lake Gravel Co., Lacon, Ill.; Manning & Locklin Northville Co., Northville, Mich.; Sicily Island Sand & Gravel Co. (now owned by Gifford-Hill & Co.), Sicily Island, La.; Tupelo Sand & Gravel Co., Tupelo, Miss.; Waco Pit Sand & Gravel Co., East Waco, Tex.; Charles Warner, Waterford, Cal.



The 325-hp. Diesel-generator set which operates all equipment on the new dredge of the Kanawha Sand Co.

The American Aggregates Corp. rebuilt its Plant 13B at Oxford, Mich. to increase its capacity and make possible the production of 100-per cent. crushed material. Vibrating screens replaced old revolving screens and two Greenville roll crushers and other equipment were added.

The American Sand & Gravel Co., Hattiesburg, Miss., built a new steel dredge and installed a Tyler screen.

The Arkhola Sand & Gravel Co., Van Buren, Ark., bought a 70-ft. steel dredge made by the Nashville Bridge Co. The equipment includes a 10-in. pump and a 300-hp. motor.

Burton Canfield, Inc., Cedar Grove, N. J., installed two Cedar Rapids jaw crushers, a 2-deck vibrating screen and a belt-conveyor. The capacity of the plant was doubled.

The Charles Black Sand & Gravel Co., Hammond, La., installed a 262½-hp. Buckeye Diesel engine on its dredge.

The Forrest County Gravel Co., Hattiesburg, Miss., launched a new steel dredge equipped with a 10-in. Diamond pump.

Gifford-Hill & Co. built a new all-steel dredge at Forest Hill, La., and installed a Pioneer shaker screen at Roanoke, Tex.

The Golden Sand & Gravel Supply Co., Golden, Miss., installed a new dredge and rebuilt its washing-and-screening plant, adding new equipment.

The Kanawha Sand Co., Parkersburg, W. Va., early in 1936 completed a new floating screening plant which has a 325-hp. Cooper-Bessemer 6-cyl. Diesel engine direct-connected to a Westinghouse alternator. This unit operates all motors on the boat. Equipment includes a Symons 4-ft. cone crusher, a Link-Belt vibrating screen and a revolving screen of the same make, Lidgerwood hoists, and belt conveyors and bucket elevators. A 35-hp. Waukesha-Hesselman oil engine drives an alternator which supplies current for lights and pumps when the Diesel engine is not operating. This floating plant can be converted into a dredge by the installation of a digging ladder for which space has been left. An article describing these operations was published in the September, 1936, issue of PIT AND QUARRY.

Kivett & Reel, Inc., Sun, La., in 1936 replaced steam power with a 262½-hp. Buckeye Diesel engine which generates power for the plant and the dredge. A Niagara vibrating screen and new belt-conveyors were installed in the plant and an 8-in. Amsco counterflow pump in the dredge.

The Koch Sand & Gravel Co., Wapakoneta, O., completely remodeled its plant. A 60-hp. Allis-Chalmers gasoline engine, a Deister Plat-O screen, a Greenville roll crusher and a Morrow sand-drag were added. The capacity was nearly doubled.

The Mississippi Sand & Gravel Co., Kolola Springs, Miss., remodeled its entire plant. The equipment installed included a 2½-cu.yd. Sauerman Crescent scraper, an American hoist, a Link-Belt screen, two Link-Belt screw dewaterers, and a 1¼-cu.yd. Lima drag-line powered with an 88-hp. Caterpillar Diesel engine.

The Missouri-Illinois Material Co., formerly the Alpha Sand Co., acquired the plant of the Denton Gravel Co. and made numerous repairs and improvements.

The Moulding-Brownell Corp. installed a Stephens-Adamson traveling stacking conveyor at Cayuga, Ind.

The Neal Gravel Co. added a new power shovel and screening equipment at Attica, Ind.

The Northern Gravel Co., Muscatine, Ia., rebuilt part of its plant which was damaged by a $50,000 fire.

The Portland Sand & Gravel Co., Portland, Pa., suffered severe fire damage at its plant which is now being rebuilt at a cost of $37,000.

Ray & Son, Inc., Louisiana, Mo., made a number of improvements, including the installation of a 4-ft. Symons cone crusher.

A new dredge was put in operation by the Springfield-Pekin Sand & Gravel Co., Pekin, Ill.

The Suffolk Materials Corp., Port Jefferson, N. Y., installed a Cedar Rapids roller-bearing jaw crusher and a Cedar Rapids Symons screen.

The Tecumseh Gravel Co., Tecumseh, Mich., in March, 1936, installed a 187-hp. Buckeye Diesel engine on its dredge. This engine operates the 10-in. dredge pump, the 40-ft. cutting ladder, the hoist and all other equipment on the dredge. This installation was described in the November, 1936, issue of PIT AND QUARRY.

Ulster Davis, Inc., Rensselaer, N. Y., installed an 8-in. Lawrence sand pump and a Diesel engine on a dredge.

The Vincennes Sand & Gravel Co. installed a 6-in. dredge pump and a 3-deck Simplicity screen at Lawrenceville, Ill.

The Waters & McCrary Gravel Co., Columbus, Miss., installed a new steel dredge with a 10-in. Amsco pump. The plant was moved to a new location and improved.

The Warner Co. installed a 3-deck Allis-Chalmers Low-Head screen at its Van Sciver plant near Morrisville, Pa. Orders were recently placed for twelve 1,000-ton steel barges to cost from $12,000 to $15,000 each. Six are to be built by the Dravo Contracting Co. and six by the Ingalls Iron Works. A steel tug boat has also been ordered.

Ready-Mixed (from page 76)

nance. This year's volume will be perhaps 5 per cent. greater. Eighty per cent. of the output was sold on a strength basis. Indianapolis' specifications call for 3,500-lb. paving concrete.

Thirteen manufacturers in New York produced 900,000 cu.yd. of concrete in 1936, an increase of 60 per cent. over the 1935 output. They operated 20 batching plants and 180 truck-mixers and utilized about 60 per cent. of their capacity, according to J. H. Dixey, vice-president, Transit Mix Concrete Corp. Prices were better except on large projects. Public works took 75 per cent. of the output. Mr. Dixey believes that the erection of government and contractor plants can be prevented by proper pricing. The trend is toward the purchase of concrete on a strength basis.

Last year showed more than a 100-per cent. increase in business in the Detroit section, Gage W. Cooper, Cooper Supply Co., Detroit, reported. Prices increased 7½ per cent. and a further 10-per cent. increase, coupled with increased volume, is expected this year. The industry operated at nearly full capacity. Factories, single houses and public works absorbed most of the output. Contractor-owned plants depress prices but do not seriously affect volume. Concrete is ordered on arbitrary proportions on large projects but in other cases on strength.

Business in the twin cities was 20 per cent. greater in 1936 than in 1935 and prices were described as "better" by J. L. Shiely, president, J. L. Shiely Co., St. Paul, but the outlook for 1937 is not so encouraging. Government-job concrete is bought on specified designs but commercial-job concrete is ordered on a strength basis.

Charles P. Maloney, president, Maloney Concrete Co., Washington, D. C., reported that nothing but ready-mixed concrete is sold in his city. Five manufacturers operate 150 trucks, and in 1936 90 per cent. of their capacity was utilized. Prices declined. Nine-tenths of the output was used on government jobs. This year business will be "better than ever," he thinks.

H. F. Thomson, vice-president, General Material Co., St. Louis, said that 1936 business was 60 per cent. above that of 1935 but still only half of the 1929-1931 yearly average. Sixty per cent. of the industry's capacity was utilized. About 45 per cent. of the 1936 business was municipal, 40 per cent. commercial and 15 per cent. public-utility. No increase in volume is expected this year. He reported a growing interest in strength concrete.

(*Continued on page 96*)

Lime, Gypsum, Other Nonmetallic Minerals Record Healthy Gains

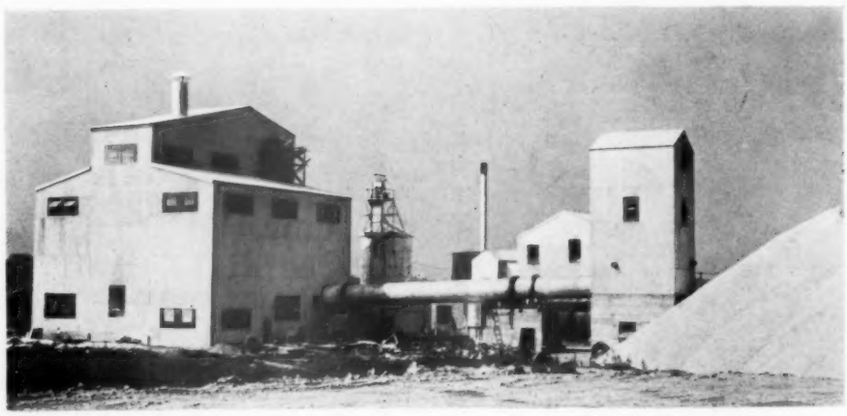
THE many nonmetallic-mineral industries not discussed in the cement and aggregate reviews also fared extremely well in 1936. Most of them shared in the general business gains during the year and some operated at capacity. Prices were firm generally but price increases in many of these industries put them in an enviable position. Many of the industries in this classification are not dependent on the building industries and these suffered little loss of business during the depression.

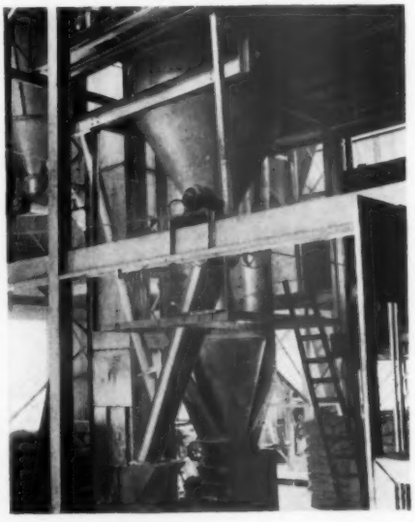
The lime industry profited from the sharp increase in private building construction in 1936 and a general increase in prices helped to put many producers back on a profit-making basis for the first time in many years. The gypsum industry enjoyed one of the best years in history due largely to the many new products developed during the depression which are now in growing demand due to the increase in private construction.

The various products industries including ready-mixed-concrete, concrete products, bituminized aggregates, etc., shared in the general improvement. Dozens of new ready-mixed-concrete producers entered the field in 1936 and most of the established producers had to add equipment to meet the growing demand for this product. A growing tendency on the part of aggregate producers to enter into the manufacture of by-products was noticeable. This is especially true in the case of stabilized road material for which a rapidly-increasing market has developed.

A modern rotary-kiln lime plant was completed late in 1936 by the Belle Isle Lime Co. at Detroit, Mich. Stone is received by boat from northern Michigan and is stock-piled at the plant. A tunnel conveyor reclaims the stone and delivers it to a bucket-elevator which discharges it into a feed hopper. The stone is then passed by gravity through a preheater which raises its temperature to about 1,000 deg. F. before it is fed to the 6-ft. by 100-ft. Vulcan rotary kiln. The lime drops from the kiln into a soaking chamber and then passes through a stationary cooler, after which it is elevated to a storage-bin.

The kiln is fired with petroleum coke which is prepared by a Raymond Imp mill. Hot air from the cooler is introduced into the mill and carries the pulverized coke into the kiln.





Above: New rotary-kiln plant of the Belle Isle Lime Co. at Detroit, Mich. Below: View of interior of plant showing modern design and equipment.

Quicklime may be loaded from the storage-bin direct into cars in bulk or may go to the pulverizing plant or the hydrating plant. Pulverizing is done by a Sturtevant hammer-mill whose product is elevated to a bin from which it is fed by gravity to a Bates valve-bag packer. Provisions are also made for direct car-loading of pulverized quicklime.

Lime for the hydrating plant is elevated to a bin from which it is weighed into a Clyde batch hydrator. The hydrated lime is then passed into a Raymond air-separator and to storage. A second bagger is used for this product.

Important improvements were completed at the Gibsonburg, O. plant of the National Mortar & Supply Co. This was described in the December, 1936 issue of PIT AND QUARRY. Two 1,800-ton reinforced-concrete quicklime silos, under which there are Fred Raymond roll feeders, were built. Hydrated lime is stored and seasoned in three new reinforced-concrete silos of 1,500-ton capacity each. Three Raymond roll feeders are under each silo. Another improvement was the installation of equipment for producing fluxing lime for the glass trade. The equipment included a Tyler 400 double-deck screen, a Stedman Type A 24-in. by 20-in. pulverizer and a 2-spout Valve Bag packer. Many Webster screw-conveyors and bucket-elevators were also installed. A new structural-steel building was erected to house the processing and loading departments. All the improvements were made under the supervision of Arnold & Weigel, engineers.

The Chemical Lime Co. has near completion its new plant at Bellefonte, Pa. The equipment includes a Traylor rotary kiln and five Kennedy-Van Saun pulverizers.

H. E. Millard has near completion a new lime plant at Anneville, Pa. The equipment includes an F. L. Smidth rotary kiln and a No. 10 Kritzer continuous hydrator.

The Mississippi Lime Co. has under construction a new plant at Ste. Genevieve, Mo. The equipment being in-

Pulverizer for fluxing lime in plant of National Mortar & Supply Co.

stalled includes a No. 10 Kritzer continuous hydrator, 2 Allis-Chalmers 300-ft. rotary kilns and air-quenching coolers.

The United States Lime Products Corp., recently completed at Sonora, Cal., an improvement program begun late in 1935 by the installation of a Raymond separator for hydrated lime. Actually a vertical-kiln lime plant has been converted into two complete plants one with a rotary kiln and the other with a vertical kiln. At the mine shaft head works a new crushing plant was built for preparation of the rotary-kiln feed. This consists of a 300-ton bin, a 20-in. by 27-in. Williams hammermill and a 3-ft. by 8-ft. triple-deck Williams screen.

A new 6-ft. by 120-ft. Traylor rotary kiln mounted on Timken roller-bearing rollers has been installed parallel to the existing row of 13 vertical kilns. Two of these kilns now serve as feed bins for the rotary kiln. Under the kiln is a 4-ft. by 36-ft. Traylor rotary cooler. The lime leaving the cooler is elevated to a steel picking belt which discharges it on a triple-deck Link-Belt screen. Three of the old vertical kilns serve as storage silos for the quicklime. Complete automatic control and recording equipment has been installed. The remaining 8 vertical kilns are a separate complete plant.

The Dallas Lime Co. of Dallas, Tex., completed a new lime plant at Bromide, Okla.

The Solvay Process Co., which in 1936 put in operation a new alkali plant at Baton Rouge, La., purchased for $550,000 the quarry and crushing plant

U. S. Lime Products Corp. mine-shaft head and new crushing plant.

of the Louisiana Stone & Lime Corp. at Winnfield, La. and the lime plant at Easton, La., which will be transferred to Winnfield. Most of the rock quarried and lime produced will be used in the alkali plant but some will be marketed.

The Ohio Hydrate & Supply Co., Woodville, O., installed an Eberhart super-mixer on one of its hydrators. Several Symons screens and a Marion shovel were also purchased.

The Marble Cliff Quarries Co., Columbia, O., installed a Raymond direct-firing bowl mill on one of its rotary kilns and is now installing a second mill.

The Ste. Genevieve Lime & Quarry Co., Ste. Genevieve, Mo., put in operation a Diesel-generating plant. Two National Superior Diesel engines of 750- and 375-hp. drive Allis-Chalmers a.c. generators.

The Louisville Cement Co. installed a Raymond direct-firing bowl mill and made other improvements at Milltown, Ind.

The Ash Grove Lime & Portland Cement Co. installed a No. 10 Kritzer 6-cyl. continuous hydrator at Galloway, Mo. This machine is equipped with a prehydrator.

The Standard Lime & Stone Co. installed three Raymond direct-firing bowl mills in its lime and dolomite plants and five more are now being installed.

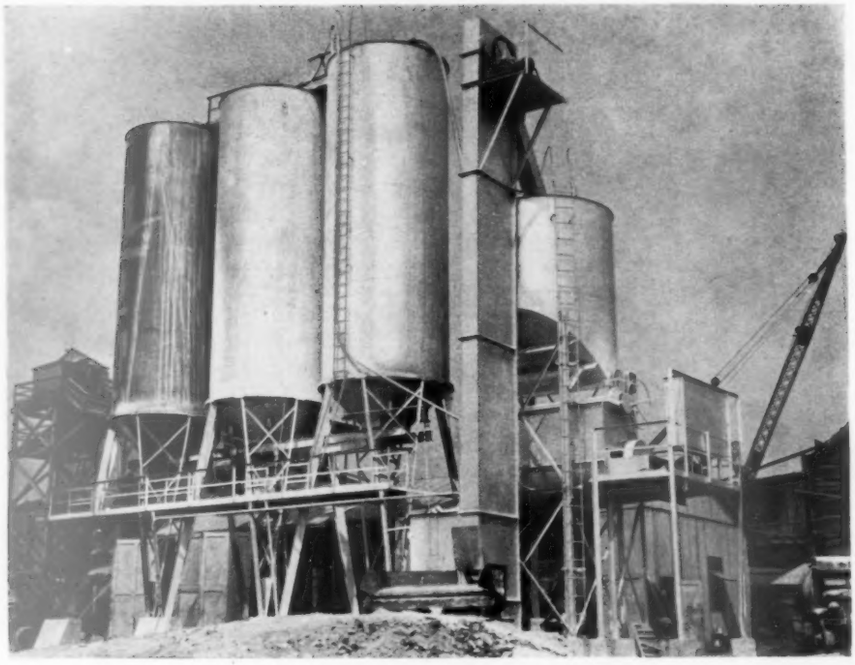
The Dolite Co., Gibsonburg, O., in 1936 completed a new plant for the production of dead-burned dolomite. Modern equipment was installed, including a Babcock & Wilcox direct-firing pulverizer, a 4-ft. Symons cone crusher, a Symons screen, a Schaffer poidometer, a Redler conveyor, etc.

New rotary kiln and screening building of U. S. Lime Products Corp.

National Mortar & Supply Co. plant at Gibsonburg, O., with new silos and processing building at right.

The Warner Co. in 1936 installed its second Brooks-Taylor lime-putty plant at its Berks St. yard in Philadelphia, Pa. This is similar to the one installed in 1935 at Wilmington, Del.

The Super Concrete Corp. early in the year put in operation a Brooks-Taylor lime-putty plant at Washington, D. C., which was described in the September, 1936 issue of PIT AND QUARRY. The patented Brooks-Taylor process for manufacturing lime putty insures a constant supply of fully-aged quicklime putty of consistently-high quality.



The new lime-putty plant of the Super Concrete Corp. at Washington, D. C. The unpainted tank at left was added to increase capacity.

Loading dock of the raw-gypsum producing plant operated at Little Narrows, Cape Breton, N. S., by the Victoria Gypsum Co., Ltd.

The outstanding plant development in the gypsum industry in 1936 was the new plant of the Victoria Gypsum Co., Ltd., at Little Narrows, Cape Breton, Nova Scotia, which was described in the November, 1936 issue of PIT AND QUARRY. Nearly a million dollars was expended on this raw-gypsum producing plant and on the dock where ocean-going freighters are loaded. The plant capacity is about 200 tons per hr. and this can easily be doubled. Boats can be loaded at the rate of 1,000 tons per hr. The equipment includes two P & H 1¼-cu.yd. Diesel shovels, Pennsylvania primary and secondary single-roll crushers, Stephens-Adamson vibrating screens and belt-conveyors, and a Merrick Weightometer. Power for the plant's operation is supplied by a 250-hp. Ruston Diesel engine driving an alternator.

The National Gypsum Co., Buffalo, N. Y., which in 1935 absorbed the Universal Gypsum & Lime Co., has well under way a $500,000 improvement program which involves all its 8 gypsum and lime plants. At Rotan, Tex., a new gypsite-crushing plant was built and the board plant was improved. The equipment added includes a Pennsylvania crusher and a tube-mill. At Akron, N. Y., a tube mill was installed, the board plant was improved, and a Pennsylvania crusher was set up. At Fort Dodge, Ia., 326 acres of gypsum deposits were acquired and a new board plant will be built. At York, Pa., National City, Mich., and Oranda, Va. extensive improvements are also being made. Many improvements were also made to its lime plant at Luckey, O.

The National Gypsum Co. late in 1936 acquired the Atlantic Gypsum Products Co., Boston, Mass., which owns three plants at Portsmouth, N. H., New York, N. Y., and Chester, Pa., and deposits in Nova Scotia.

The high-side mill and dust-collector of the Southern Talc Co. at Chatsworth, Ga.

One of the four dual magnetic separators installed by the Consolidated Feldspar Corp. at Erwin, Tenn.

Gypsum, Lime & Alabastine of Canada, Ltd., has announced plans for improving its plants at Caledonia, Ont., and Montreal, Que., at a cost of $90,000. Among the additions at Montreal will be a rock-wool department.

The Jumbo Plaster & Cement Co. has announced that its plant at Sigurd, Utah, which was destroyed in 1932 will be rebuilt and equipment installed at a cost of $65,000.

The Seneca Rock Wool Co., Tiffin, O., built a rock-wool plant with a capacity of 40 tons daily. A new method of production is used.

New rock-wool plants were also built by the Western Rock Wool Corp. at Huntington, Ind. and by the Marblehead Lime Co. at Marblehead, Ill.

The Marquette Cement Mfg. Co. in 1936 completed a plant for the manufacture of rock wool at Oglesby, Ill.

The Consolidated Feldspar Corp. was again prominent in developments of that industry. In 1936 an extensive improvement program was completed at Consolidated's Erwin, Tenn., plant which was described in the October, 1936 issue of PIT AND QUARRY. Two 3-ft. Symons short-head cone crushers replaced a single 4-ft. unit and four Exolon double magnetic separators were installed to reduce the iron content of the higher-grade products. Other equip-

ment installed included two Jeffrey-Traylor vibrating screens and a Norblo dust-collector.

A new plant was built at Erwin, Tenn., by the North Carolina Feldspar Corp., and this was described in the August, 1936 issue of PIT AND QUARRY. The major equipment includes a Hardinge conical mill, a 14-ft. Gayco separator, and a Jeffrey-Traylor vibrating screen.

The F. E. Schundler Co., Joliet, Ill. has a new feldspar plant at Custer, S. D.

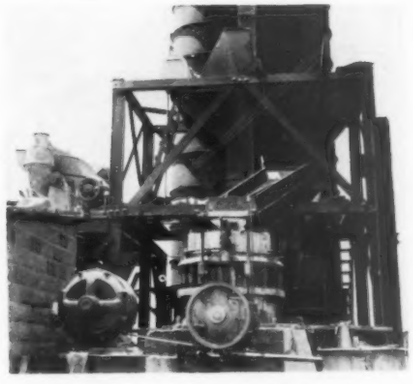
A Norblo dust-collector was installed in its crushing department at Canon City, Colo., by the Western Feldspar Milling Co.

The Colorado Feldspar Co. is said to have under construction a new feldspar plant at Canon City, Colo.

The West Coast Borax Co. is developing a large deposit of talc at Randsburg, Cal. Storage bins and processing equipment have been installed.

Another new plant is that of the Southern Talc Co. at Chatsworth, Ga., which was described in the June, 1936 issue of PIT AND QUARRY. Both ground and crayon talc are produced. Two Chevrolet trucks haul the raw talc 2½ mi. from the mine to the plant. The equipment in the plant includes a Williams No. 1 Jumbo Jr. hammer-mill, a Williams 4-roller high-side mill with a 7-ft. Super-Separator, a Williams bag-type dust-collector, and a Williams double-deck vibrating screen.

The outstanding development in the rock-asphalt industry was the new plant of the Southern Rock Asphalt Co. at Dougherty, Okla., which replaced the



Crusher, separator, etc., at rebuilt plant of Ohio Quartz Products Co.

plant destroyed by fire June 19, 1936 at a loss of $50,000. Two Williams hammer-mills were salvaged but all the other equipment is new. A feature of this plant is the blending of raw material by three Johnson automatic weigh-batchers. Other new equipment includes Chain-Belt pan- and belt-conveyors, two Telsmith vibrating screens, a Pioneer screen, and a Gardner-Denver compressor. A new Fairbanks-Morse 300-hp. Diesel engine driving a

One of the fleet of trucks operated by Jahncke Service, Inc., New Orleans, La.

generator supplies power for the plant.

The Kentucky Rock Asphalt Co. in 1936 built a $25,000 plant at Bowling Green, Ky., for the processing of lean rock asphalt.

The Ohio Quartz Products Co., Jackson, O., in 1936 built a new plant to replace the one destroyed by fire in 1935 at a loss of $75,000. This new plant was described in the August, 1936 issue of PIT AND QUARRY. The new equipment installed included a 3-ft. Symons short-head cone crusher, a Tyler Hum-mer screen, two Orville Simpson Rotex screens, an American Rotoclone, and a Boyd Model X dry press for the manufacture of refractory bricks.

The Lucas Silica & Real Estate Co., Festus, Mo., built a silica-sand plant with a capacity of 300 tons daily. A ¾-cu.yd. electric shovel is used in the pit.

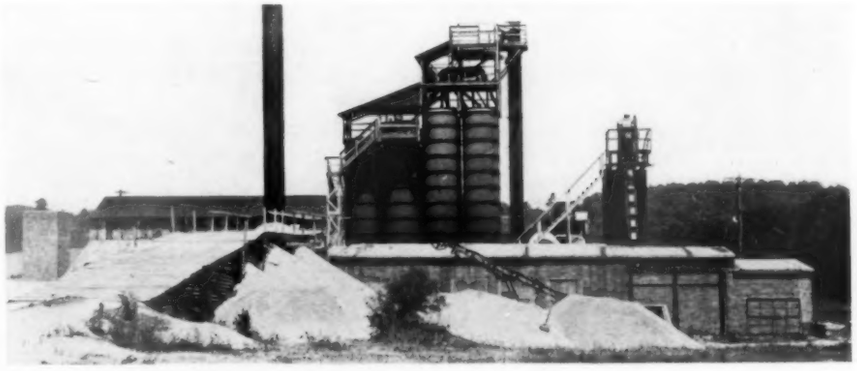
The White Rock Silica Co., Brownton, Wis., rebuilt its silica-sand plant at a cost of $20,000. A 1-cu.yd. combination shovel and drag-line was purchased.

The Wedron Silica Co., Wedron, Ill. purchased a 12-ton Whitcomb gasoline locomotive.

The Koenig Coal & Supply Co., Oxford, Mich., installed a complete Hetherington & Berner drying-and-screening plant for the production of blast sand. A Simplicity vibrating screen is used.

The Victor Mica Co., Spruce Pine, N. C., completed a $50,000 addition to its plant.

The Barnsdall Tripoli Corp. started the production of pumice at an experimental washing-and-sizing plant near Grants, N. M. An experimental grinding-and-sizing plant was built at Seneca, Mo.



Plant of the Ohio Quartz Products Co. at Jackson, O., which replaced plant destroyed by fire.

The plant of the Southern Rock Asphalt Co., Dougherty, Okla., which replaces burned plant.

The J. M. Huber Pigment Co., Langley, S. C., made improvements costing $40,000 to its kaolin plant.

The Emeralite Surfacing Products Co. built a new roofing-granule plant at Ely, Minn., to replace the one destroyed by fire in 1935 at a loss of $75,000.

The Vermont Production Co. in February, 1936 took over the plant and property of the Vermont Asbestos Corp. near Hyde Park, Vt., and made many improvements. The equipment added included a 1¾-cu.yd. Marion electric shovel, three 10-ton Mack trucks, a 5½-ft. Symons cone crusher, an Ingersoll-Rand air-cooled compressor and a number of shaking tables.

The Florida Dolomite Co., Sarasota, Fla., put in operation a new plant for the production of dolomite for fertilizer filler. The new equipment installed includes an Allis-Chalmers Pulverator and an American ring-roll pulverizer. A rotary drier, a Diesel-generating unit, several crushers and a screen were also installed.

The Filtrol Corp., Jackson, Miss., in June, 1936 put in operation a new plant with a capacity of 60 tons of pulverized filter clay in 24 hr. The new equipment includes a Bucyrus-Monighan walking drag-line, Chevrolet trucks, Hardinge thickeners and a Raymond separator, an Imp mill and flash-drying system.

The Gravel Products Corp. on June 15, 1936 started production at a new $75,000 concrete-pipe plant at Tonawanda, N. Y. Both McCracken and Quinn pipe-making machines are used.

The F. A. Rider Sand & Gravel Co., Vestal, N. Y. installed a Dunbrik concrete brick and block plant which was described in the October, 1936 issue of Pit and Quarry.

The Consolidated Gravel Co., Columbus, Ga. built an asphalt-mixing plant for black-top road surfacing.

The New York Trap Rock Corp., installed a Warren Bros., asphalt plant on its crushed-stone-plant property at Stoneco, N. Y.

The Servtex Materials Co., New Braunfels, Tex., recently installed a Warren Bros., asphalt-mixing plant. The equipment includes a twin pug-mill mixer, two 10,000-gal. storage tanks, a rotary drier, etc. The capacity is about 25 tons per hr.

The Miami Lime & Chemical Co., Miami, Fla., which several years ago announced its intention of producing dry ice, in 1936 built a Gillette System plant which produces lime as a by-product. Equipment was supplied by the York Ice Machinery Co.

Of the many new ready-mixed-concrete plants built in 1936 a few are mentioned below. The Koenig Coal & Supply Co. at its Detroit, Mich., yard installed a Butler batching plant and ten 4-cu.yd. Jaeger truck-mixers. The Strathmann Sand & Gravel Corp., Philadelphia, Pa., entered the industry with a modern central-mixing plant and a fleet of Blaw-Knox agitator trucks. Other new producers include the Ready Mixed Concrete Co., (subsidiary of the J. W. Brannan Sand & Gravel Co.,) Denver, Colo.; the Western Indiana Gravel Co., Terre Haute, Ind.; the Llanerch Ready Mix Concrete Co., Norristown, Pa.; and the Andersen Sand & Gravel Co., Saginaw, Mich.

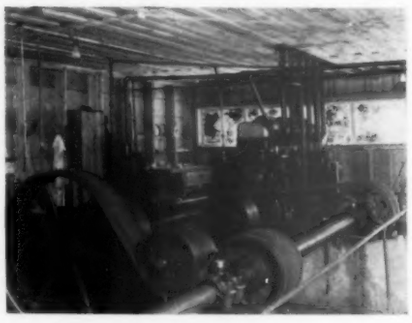
The Maule Ojus Rock Co., Miami, Fla., installed three batching plants and a fleet of mixer-trucks. The fleet has been steadily enlarged and now consists of 17 Blaw-Knox 1½- and 2-cu.yd. truck-mixers mounted on Ford chassis. A complete description of this operation was published in the November, 1936 issue of Pit and Quarry.

The I. S. Schilling Co., pioneer ready-mixed-concrete producer of Miami, Fla., early in 1936 purchased a Concrete Transport Mixer Co. agitator and later in the year added several additional units to its fleet.

The Fort Worth Sand & Gravel Co., Fort Worth, Tex., added 7 Jaeger 2-cu.yd. truck-mixers to the 13 already in operation.

The Henry Nelch & Son Co., Springfield, Ill., purchased two Concrete Transport Mixer Co. units.

Jahncke Service, Inc., New Orleans, La. purchased a number of Concrete Transport mixers, making a total of nine 1-, 1½-, and 2-cu.yd. units now operated by this company.



Diesel engine which operates the plant of the Skagit Talc Co., Inc.

The Warner Co., Philadelphia, Pa., in 1936 increased its already large fleet of truck-mixers. Twenty 6-cu.yd. Mack trucks and 22 mixer bodies were purchased. Six of these were of Blaw-Knox manufacture, eight were Jaeger and eight were Chain Belt.

The American Aggregrates Corp. late in 1936 completed a plant at Green Oak, Mich. for the production of stabilized road material. It has a capacity of 500 tons daily. Calcium chloride is mixed with the soil and gravel in a pug-mill. This plant was described in the November, 1936 issue of Pit and Quarry.

The new stabilized-road material plant of the Ray Sand & Gravel Co. at Oxford, Mich., described in the October, 1936, issue of Pit and Quarry has a capacity of 40 tons per hr.

The Skagit Talc Co., Inc., early in 1936 installed a 6-cyl., 135-hp. Atlas Imperial Diesel engine to operate its plant and mine at Sedro-Wooley, Wash. The plant equipment is driven through a line shaft and belts. An alternator driven from this shaft powers the mine saw and a generator supplies lights. A compressor furnishes air to operate a mine cutter. A complete description of this plant was published in the September, 1936 issue of Pit and Quarry.

Ready-Mixed *(from page 91)*

On the subject of *Control and Inspection Methods* E. B. Rayburn, Jr., remarked that he does not regard slump as an accurate index of workability within 1 in. Julius Adler, consulting engineer, said that there is a tendency to exact precise control of consistency, strength, size of aggregate, etc. on the part of the buyer of concrete. The emphasis placed on consistency is, in his opinion, exaggerated. Men on the job think they can detect slight differences in consistency as expressed in slump. R. B. Young of Toronto said that inspection has a twofold purpose: (1) to insure quality as a protection for the buyer and the manufacturer of concrete, and (2) to provide data for use by the manufacturer in proving his ability to furnish concrete of the required characteristics and to furnish customers with definite information.

J. L. Shiely, St. Paul, told of his use of vibrators on aggregate bins to loosen frozen material and mix it with that not frozen. Electric strip heaters are employed.

The tentative standards for truck-mixers and drum-type agitator trucks were approved with minor changes.

The old officers were reëlected unanimously: President, J. L. Shiely (St. Paul); vice-presidents, P. F. Ayer (Boston), James F. McCracken (Louisville), and R. B. Young (Toronto); secretary, J. H. Dixey (New York); treasurer, Stephen Stepanian (Columbus). Other members of the executive committee are: Stanton Walker, director of engineering, and V. P. Ahearn, executive secretary of the association; and H. F. G. Pelsue, Los Angeles, member-at-large.

The new processing plant of the Kentucky Rock Asphalt Co. at Bowling Green, Ky. Batching and mixing building is in foreground.

System of Drying and Blending Improves "Lean" Rock Asphalt

THE operations of the Kentucky Rock Asphalt Co. at Kyrock and Bowling Green, Ky., have in the past received considerable publicity in the pages of PIT AND QUARRY. A complete article on the operations of this company was published in the June 19, 1929 issue, wherein the methods then in use were fully described. During the depression this company suffered a decrease in business along with other producers, but, unlike many of them, did not let down in its efforts to increase the quality of its products and the market for them. Many quarrying and processing improvements were made during this period to achieve those ends.

An article published in the September, 1935, issue of PIT AND QUARRY described the improvements made in the operations at Kyrock during the intervening period. This article also described the unprocessed lean rock asphalt which had recently been developed by the company to meet the demand for a lower-cost road material. This lean rock had been drilled, blasted and laid aside for many years in the past. Described also was a batching and mixing plant at the Bowling Green yard of the company which was erected to add bitumen to the lean rock when required by the purchaser.

As a result of experiments with many possible methods of further improving this lean rock asphalt it was decided to run the rock through a drier before mixing it with extra bitumen to insure the most intimate mixture possible. As a result this product now closely approaches the natural rock asphalt in all its qualities and characteristics. It is now also possible to mix this product and ship it out regardless of season or weather conditions. The capacity of the present drying-and-blending system is about 80 tons per hr.

Firing chamber of the 80-ft. rotary drier which is at right angles to it in background.

Formerly an aërial tramway or a locomotive crane rehandled the lean rock from the barges or stock-pile to this mixing plant. Now a steam shovel takes it from a stock-pile to a 24-in. by 90-ft. belt-conveyor which discharges it into a hopper over a drier. Portable conveyors will later be installed to facilitate handling from storage. This drier is a Hedges-Walsh-Weidner 8-ft. by 80-ft. long, indirect-heat rotary unit. A brick combustion chamber, built at right angles to the drier, has a Ray oil-burner and natural gas. The drier is connected to a 35-ft. steel stack which, with the ½-in. to 1-ft. inclination of the drier provides ample draft and draws the flame into this chamber.

The firing chamber is an 18-ft. section of an old boiler and is 6 ft. in diameter. It is lined with 9 in. of fire-brick. A 60-in. tube, also lined with fire-brick, connects with the drier, which is unlined but has flights that agitate the material and facilitate drying.

In addition to carrying off the moisture released by the rock this air assists in the drying. A No. 3½ Clarage fan with a capacity of 29,000 cu.ft. per min. exhausts the air from the drier to the atmosphere. The drier is driven at about 4.5 r.p.m. by a 125-hp. electric motor through chain and gears. The material takes about 18 min. to pass through the drier.

The dried rock is dropped from the drier through a chute on a 24-in. by 92-ft. inclosed belt-conveyor which discharges it into the mixing-plant bins. No change has been made in this plant since it was previously described. Briefly, the lean rock and bitumen are weighed separately and batched into a pug-mill mixer of 2-ton capacity. As before, the finished product is discharged direct from the mixer into cars or trucks for shipment.

According to H. St. G. T. Carmichael, vice-president and production manager for the Kentucky Rock Asphalt Co., under whose supervision this processed rock asphalt has been developed, this material was sold in 16 states in 1935. The production of natural rock asphalt in both 1935 and 1936 far exceeded that of preceding years.

A few changes made in 1936 at the Kyrock producing plant also helped to improve the quality of both types of material. Additional screening facilities and a re-routing of all the materials through the same equipment have resulted in finer separation. As a result, most of the finished product now passes 98 per cent. through a No. 4 screen compared to 80 per cent. under former conditions. This finer material is an improvement over the former product for all types of applications but especially for repair work and for seal coat. A Dings magnetic pulley recently installed has also lessened the possibility of damage to the equipment. This pulley is on the belt-conveyor which precedes the hammer-mill in the flow. As much as 1,000 lb. of tramp iron, including hammers, drill points, etc., has been collected in one week of operation.

By PIT AND QUARRY'S
WASHINGTON OBSERVER
AND CORRESPONDENT

A Review of First Complaints Under the Robinson-Patman Act

THE question most frequently asked of the Federal Trade Commission is whether it is the purpose of the Robinson-Patman Act to eliminate competition. The emphatic reply always is that competition must be maintained to comply with the basic purpose of the act which is to eliminate favorites, to place all competitors on the same footing under equal conditions.

Another frequent question concerns the circumstances that may justify a cut in price. The answer is that competition justifies a price to meet the price quoted by another concern in the same field.

Next comes the query about quantity discounts. The answer invariably is that quantity discounts are justified by a saving in the cost of doing business.

Then comes the question about brokerage charges. Brokerage charges are allowable only where there is an actual service rendered.

Finally, thousands of inquiries have been received about allowances permitted under the act for advertising and window displays, a problem that does arise often in the nonmetallic-mineral industries. Advertising and window-display allowances are permitted only when they are actual expenditures for advertising and window displays and must be exactly accounted for as such. The expenditure can not be lumped with a wholesale allowance for advertising. Window displays must be itemized as lumber, labor, and whatever else may be included in providing the display. And, of course, the same allowances for the same kind of advertising and window displays must be available to all merchandisers in the same category.

The Federal Trade Commission has been construed by the U. S. Supreme Court to be a court. Its members, therefore, seldom make public statements. Commissioner Freer has made a careful statement, significant under the circumstances, which follows:

"The Federal Trade Commission has a duty to prevent unfair methods of competition in commerce. The principle upon which the commission acts is that honest competitors always should be free to conduct their business in a fair and honorable way, and that the general public should be permitted to enjoy all the benefits flowing from free and fair competition.

"Machinery is provided for attaining this objective, through compulsory proceedings, where they are necessary, *and through voluntary coöperative effort, whenever possible.*

"To accomplish in a great many cases, by wholesale, and at a great saving both to government and to business, what would take many separate and time-consuming trials on formal complaint, the commission sought and finally developed its trade-practice procedure."

It is quite apparent that Commissioner Freer and his fellow commissioners, and probably the administration, have definite hopes that these trade-practice conferences may minimize the necessity for prosecution under the Federal Trade Commission Act, the Clayton Act and the Robinson-Patman Act. Speaking of the trade-practice conference procedure Commissioner Freer said:

"Under this plan, as is well known, members of a given industry take the initiative. A substantial majority of the members of an industry, either through their trade association, through a committee of the industry, or in some other way, request the commission to sponsor a trade-practice conference. If the commission finds that there is a preponderant sentiment in the industry for such a conference, it authorizes one to be held. At that conference the industry submits proposed rules for the commission's consideration.

"Rules may be of two different types. Group 1 rules may be defined as those which prescribe methods of competition which are unfair under the law. Approved Group 1 rules afford an industry means of having these practices cataloged in plain language and of entering into an agreement for their coöperative and simultaneous elimination.

"These rules are enforceable against any offender engaged in interstate commerce, regardless of the fact that such offender may not have taken part in the conference or agreed to abide by the rules. This is true, because practices proscribed by approved Group 1 rules have been held to be illegal in and of themselves under existing court decisions.

"Group 2 rules may be styled a voluntary undertaking by an industry further to elevate its business standards. True, the commission can not be called upon to enforce these standards, since their infraction is not a violation of the law; still the very fact that a substantial majority of the members of an industry sit down together and agree among themselves that they urge the adoption or the condemnation of this or that practice has an important moral weight; and, provided they are within the law, the commission will receive such rules as expressions of the industry. The commission has sponsored over 200 trade-practice conferences for a great variety of businesses and industries.

"The Robinson-Patman Act, evidently recognizing price discrimination as being one of the strongest weapons of monopoly, quite clearly undertakes to outlaw it as such.

"Sec. 2, as it originaly appeared in the Clayton Act and has been construed by the courts, prohibited price discrimination where the effect thereof might be substantially to lessen competition in any line of commerce or tend to create a monopoly therein. Under the amendment enacted in the Robinson-Patman Act price discrimination is declared unlawful not only under these circumstances, but also where the effect may be to 'injure, destroy, or prevent com-

petition with any person who either grants or knowingly receives the benefit of such discrimination, or with customers of either of them.'

"The old Sec. 2 contained an express provision exempting price discrimination which was 'made in good faith to meet competition.' This language is not retained in the new law. There is, however, a provision in the Robinson-Patman Act affording a defense to an alleged discriminator by his showing that the discrimination was made 'in good faith to meet an equally low price of a competitor or the services or facilities furnished by a competitor.'

"Provision is also made for non-interference with certain rights one has in relation to making differentials justified by differences in the cost of manufacture, sale or delivery; in selecting one's customers in *bona fide* transactions; and in making price changes from time to time in response to changing market conditions or marketability of goods.

"In this connection it may be of interest to note that the burden of showing that a proved discrimination is of the type coming within one of the exceptions to the statute is upon the discriminator. In other words, the discriminator must shoulder the burden of establishing such definite defenses as are specified in the statute; for example, proof that the discrimination was made 'in good faith to meet an equally low price of a competitor.'

"The Robinson-Patman Act singles out and condemns a number of specific discriminatory practices, notwithstanding the fact that these practices might be considered as indirect price discriminations. It is declared unlawful:

"To grant or receive 'except for services rendered,' anything in the way of commission, brokerage or other compensation to or from an intermediary who is acting for or is subject to the control of any party to the transaction other than the one paying such compensation.

"To pay or agree to pay compensation to or for the benefit of a customer for his services or facilities unless the same compensation 'is available on proportionately equal terms' to competing customers.

"To furnish or agree to furnish any services or facilities to one purchaser that are not 'accorded to all purchasers on proportionately equal terms.'

"It is also unlawful for any person 'knowingly to induce or receive' a prohibited discrimination in price.

"The commission thus far has issued 11 formal complaints under this statute, involving about 21 respondents. These complaints bring up some of the most controversial points in the law. For that reason it may be expected that decisions thereon will be of great importance in clearing up doubtful questions.

"The first group of complaints involves the sale of cheese products by Kraft-Phenix Corp., and the Shefford Cheese Co. This is small package goods usually delivered by truck or wagon to local retail stores. It is alleged that certain differences in price are allowed on a graduated scale based upon the number of pounds purchased. There is also involved the question of the validity of a 5-per cent. discount on package cheese and salad products in lots of $5 worth or more in which one delivery is required, and the validity of a 5-per cent. discount on purchases of $100 worth per week to group buyers where store delivery is made and one billing only is required. Doubtless one of the questions which will be posed in the proceedings is whether or not the alleged discrimination is justified as quantity differentials which are the result of savings in the cost of manufacture, sale or delivery.

"The complaint against Bird & Sons, Bird Floor Covering Corp., and Montgomery Ward & Co., involves the question of discriminatory discounts or differentials to mail-order houses. It is alleged that Bird linoleum products were sold in mail-order-house purchases and in mail-order retail-store purchases at more favorable discounts or net prices, which resulted in illegal discrimination against other competing purchasers.

"The complaint against the United States Quarry Tile Co. brings up the question of functional discounts where certain customers receive wholesale discounts but sell both at wholesale and retail in competition with retailers who do not receive the wholesale discount.

"The complaints against Standard Brands and Anheuser-Busch present the matter of alleged discrimination in the sale of yeast as a product used in the baking industry. The question of the effect of the alleged discrimination upon the manufacture and sale of another product is raised. Moreover, there appears the question of the validity of differentials based on cumulative purchases. The alleged differentials per unit are infinitesimal, but in the higher brackets, which apply to large purchasers, the differentials are said to be quite substantial. For instance, bakers who purchase 3,000 lb. per month pay 18c. per lb., while those taking 10,000 lb. per month pay only 14½c. per lb. or 20 per cent. less.

"The remaining 5 complaints involve the toilet-goods business and named 13 manufacturers. They bring up the question of 'push' money and the use of hidden demonstrators in marketing toilet goods as a form of indirect price discrimination. These complaints also cover the practices as alleged violations of Sec. 5 of the Federal Trade Commission Act.

" 'Push' money is that used by a manufacturer to subsidize the sales person of a retailer to push that particular manufacturer's brand, although the sales person may have a number of manufacturers' products to sell. The use of hidden demonstrators is a somewhat similar practice involving the employment by a manufacturer of a sales person to demonstrate and sell his products in the retail store of his customer without disclosure of the fact that such clerk is not an employee of the retailer but is paid by the manufacturer for the purpose of inducing the public to buy his brands which are sold over the counter in competition with the brands of other manufacturers."

The answers in these cases are of wide significance in the evolution of the interpretation of the Robinson-Patman Act. The Kraft-Phenix Corp. sets up as a defense that the act applies only to transactions with retailers, whereas the corporation deals only with wholesalers and jobbers. It shows that it has organized a separate concern—the Kraft Associated Distributors, a Delaware corporation—with 140 branch offices and warehouses in various sections of the United States, and actual delivery was and is accomplished almost entirely through the subsidiary corporation. It thus claims that it sells its wares legally to a proper separate organization, and that this separate organization carries on an intrastate business in each separate state, also perfectly legal. It further claims that its methods of stimulating trade through discounts, etc., in intrastate trade increase rather than hinder interstate trade, and that the right to use those methods is "property" which the Fifth Amendment ordains shall not be taken away without due process of law. It asserts the act is inconsistent, Sec. 2 (a) requiring proof of injurious effects upon interstate commerce, while Sec. 2 (b) authorizes a cease-and-desist order upon the mere showing that discounts, etc., are given—*i. e.*, upon half-proof—which contravenes the limitations upon Congress contained in the "due-process" clause of the Fifth Amendment. It also contends that the half-proof demonstrates that this violation of the Fifth Amendment would deprive the corporation of its property rights without due process, etc. It maintains that it conducts a private business, not a public utility like the railroads or telephone companies, and hence Congress has no right to deprive the corporation of "liberty and property" in contravention of the Fifth Amendment.

The Shefford Cheese Co. claims its

business is conducted purely within state lines, and legal authorities hold that, to win, the government must show a secondary interference with the legitimate flow of interstate commerce and the proportionate tendency to prevent competition. It is also believed there is much virtue in its plea that in the absence of store-to-store delivery, which necesasry item of expense must be met by the customer, the customer is entitled to the discounts and allowances which the government seeks to prohibit.

Bird & Son and the Bird Floor Covering Sales Corp. deny any grounds for action on the same constitutional grounds advanced by the foregoing and by Montgomery Ward & Co. The latter concern denies the legality of Sec. 2(b), the so-called criminal section, which was put in the act by Borah and Van Nuys and which concerns "knowingly inducing or receiving a discrimination in price." It also pleads the voiding effect of the commerce clause of the constitution, Art. I, Sec. 8, Par. 3; the reserved powers of the Tenth Amendment; the general vagueness of the act; the summary procedure which casts the burden of proof upon the accused—a practice contrary to the fundamental policy inherent in the framework of the Anglo-Saxon law, a procedure antithetical to the assumption that a man is innocent until he is proved guilty. But the most striking attack upon the act is the assertion that it is a violation of the very first words of the constitution, Art. I, Sec. 1, which are: "All legislative powers herein granted shall be vested in a Congress of the United States." This article is interpreted as invalidating all the legislative powers which the act has delegated to the officers of the Federal Trade Commission. And, finally, the answer declares that the act violates the Fifth Amendment because the criminal or penal clause deprives the accused of liberty and property without a full and fair trial and, therefore, without due process of law.

The United States Quarry Tile Co. filed its answer to the complaint based upon an alleged violation of the Robinson-Patman Act. The answer was given out December 28, by the Federal Trade Commission. The company sets up the following Special Defenses:

That if it has made any differential in price since June 19, 1936, between customers competing in the sale of any of its glazed tiles, the differential represents only due allowances for differences in the cost of manufacture, sale, or delivery resulting from the differing methods or quantities in which the tiles are sold or delivered, or represents price changes made from time to time in response to changing conditions affecting the market, or marketability; or that any lower price was given in good faith to meet an equally low price of a competitor.

That such differential represents only reasonable payment for services or facilities furnished by the customer receiving a lower price in connection with the handling, sale or offering for sale of the tile, and that the lower price is available on proportionately equal terms to all other customers competing with the customer.

That the complaint does not allege that the effect of the alleged discrimination may or has been substantially to lessen competition or to injure, destroy, or prevent competition, or to tend to create a monopoly in interstate commerce and that the complaint is, therefore, insufficient to sustain a valid cease-and-desist order.

That the Robinson-Patman Act is unconstitutional when it attempts to regulate transactions having no direct effect upon interstate commerce, and when it attempts to regulate intrastate commerce, such law exceeding the constitutional powers of Congress to regulate commerce between and among the states.

That Sec. 1(b) of the act is unconstitutional because it is in conflict with the Art. V of the amendments to the constitution in authorizing the Federal Trade Commission to issue cease-and-desist orders upon a showing of price discrimination not conditioned upon any finding of any effect upon interstate commerce.

That the act is invalid because it is so vague and uncertain that it deprives a citizen of liberty and property without due process of law as guaranteed by the Fifth Amendment, *and that the fixing or regulation of the prices of products is unconstitutional.*

The answers of the Standard Brands and Anheuser-Busch have not yet been filed. The answers of the 13 manufacturers of toilet goods and cosmetics justify the practices for which they are cited, and maintain that the act is obscure, making it impossible for the defendants to understand its meaning, which therefore denies them the due-process provision of the Fifth Amendment; also that Sec. 2(b), the criminal provision, is unconstitutional and void because it authorizes the Federal Trade Commission to issue a cease-and-desist order solely upon proof of discrimination in price, without proving that the effect may be substantially to lessen competition, create a monopoly, etc.; also that Sec. 2(b) is unconstitutional because the cease-and-desist order has no rational relationship to the purpose of the Clayton Act, of which Sec. 2(b) forms a part, and therefore violates the Fifth Amendment. They also claim that the act is unconstitutional because it attempts to deprive them of property without due process of law in violation of the Fourteenth Amendment; that the Act is an illegal delegation of the powers of Congress; and that the act is not reasonably and rationally designed to effectuate the purpose which was contemplated by Congress. They assert that, under the Code of Fair Competition promulgated by the President in accordance with the National Industrial Recovery Act, the methods of competition now made the target for civil and criminal legal attack were expressly recognized and approved.

Somewhere in the neighborhood of 50,000 letters have been received by the Federal Trade Commission in the past six months regarding the act. This number and the sources from which the letters come are unprecedented in the experience of any similar government agency. Hundreds of complaints have been considered sufficiently serious to warrant investigation. These complaints are received in the form of a simple communication and are regarded as strictly confidential. While the commission investigates complaints it seldom initiates them, although it is empowered to do so. At present over fifty cases are being probed by investigators and examiners. Some will undoubtedly result in formal action, while others will be dropped for lack of sufficient evidence. As Commissioner Freer intimated in his statement, a wide diversity of cases are being chosen for trial at this time in order to explore the possible applications of the law. As a matter of fact it is held that probably every business in the country, from the newsstand on the corner to the huge corporation, is violating the act in some particular; and it is felt that there is no doubt that the commission could bring proceedings against tens of thousands of firms and individuals.

But, aside from the desire to test the law in its various aspects, there is the question of funds to pay for the proceedings; there is unquestionably a doubt about the constitutionality of some phases of the law; and there is the question concerning the policy the administration may determine to lay down about the whole problem of business regulation which involves its future relations with business and further regulatory measures that may evolve a new department of government with a new cabinet officer.

When Congress enacted the Robinson-Patman Act it specifically directed that it should be enforced by the Federal Trade Commission. The act unquestionably was formulated by Representative Patman principally to correct chain-store abuses of trade practices.

More specifically it was instigated, according to the Washington that is "in the know," by the wholesale grocers. There are many reasons to believe that neither Mr. Patman, nor Senator Robinson, had in mind that it should cover all the business of the nation. It has been questioned whether the President understood that it presented such a potential weapon against all business malpractice that had been immune from prosecution under the anti-trust laws and the Federal Trade Commission Act. Therefore, those identified with the obvious objects of the act did not expect that its enforcement would necessitate the expenditure of additional funds, except such funds as might be easily and incidentally available to the commission in its ordinary transactions.

There are reasons to believe that some of the clever members of the Federal Trade Commission staff actively helped to formulate the act. After it was enacted the word came from the commission's offices that it would be unconstitutional to apply the law solely to chain stores since such a law would be class legislation. Therefore, the act must apply to all business. It was clear that the commission felt assured it now had a statute that had "bite" in it. It put steam behind the commission's punch, as it were. In order to try the effect the commission readily scraped about in its own cash boxes for the time being for the funds to pay the expenses of the experimentation.

Meanwhile, the act has gradually caused an awakening of business to the realization that industry must crystallize its thought about more uniform and thorough regulation, actively and practically applied. There are 534 national trade, industrial and other business associations represented in the nation's capital, whose executive directors are virtually unanimous in their confidence that the next Congress will do something about it. Just exactly what it will do is not so clear. There is one school which believes that the Robinson-Patman Act will naturally fall by the wayside by reason of final adjudication in the U. S. Supreme Court, and that after its nullification Congress will enact a law more agreeable to business itself. This school of thought also believes that business will form a closer *liaison* with the President by means of the closer relationship of business with Donald Richberg. Mr. Richberg for some months past has been going about the country making friends with industry, and there is a very clear impression abroad that his former close affiliation with labor is a thing of the past. The idea that is very industriously promulgated by these representatives of industry would have you believe that the President plans to weld the several agencies of government that regulate business into one great body and to place this new agency under the direction of Mr. Richberg. Whether this body is to be the Department of Commerce or whether it is to be a new department has not yet emerged from the clouds of conjecture. There is considerable feeling among these industrial representatives that is not friendly towards Mr. Roper. They do not take him very seriously. It would meet their ideas if Mr. Richberg were to become Secretary of Commerce, or if he were to become secretary of the much-discussed new cabinet department that is supposed to be in the offing. Some of them would even be content to take him as Secretary of Labor, when Miss Perkins goes, which is looked forward to as more or less certain.

Richberg came into the New Deal picture in the beginning as the champion of labor and as an ultra-progressive. He now is very distinctly not the representative of labor, and he certainly has not gained the confidence of industry. He is definitely and openly opposed to the Robinson-Patman Act. He seems to classify it as a melange of incongruities that came into existence by error and accident. It is from his camp that you hear the suggestion that the act never would have been enacted without Robinson's name upon it, and that it would probably never have been signed by the President without Robinson's influence. And Richberg is openly critical of the Federal Trade Commission. He is convinced that business regulation requires the creation of two new agencies—one for enforcement and another to administer regulation. This suggestion is the well from which springs the often-heard intimation that the President purposes to create a new cabinet office. As a matter of fact, if a new department is created, it will in all likelihood be a department of welfare, embracing the many social agencies that now function independently.

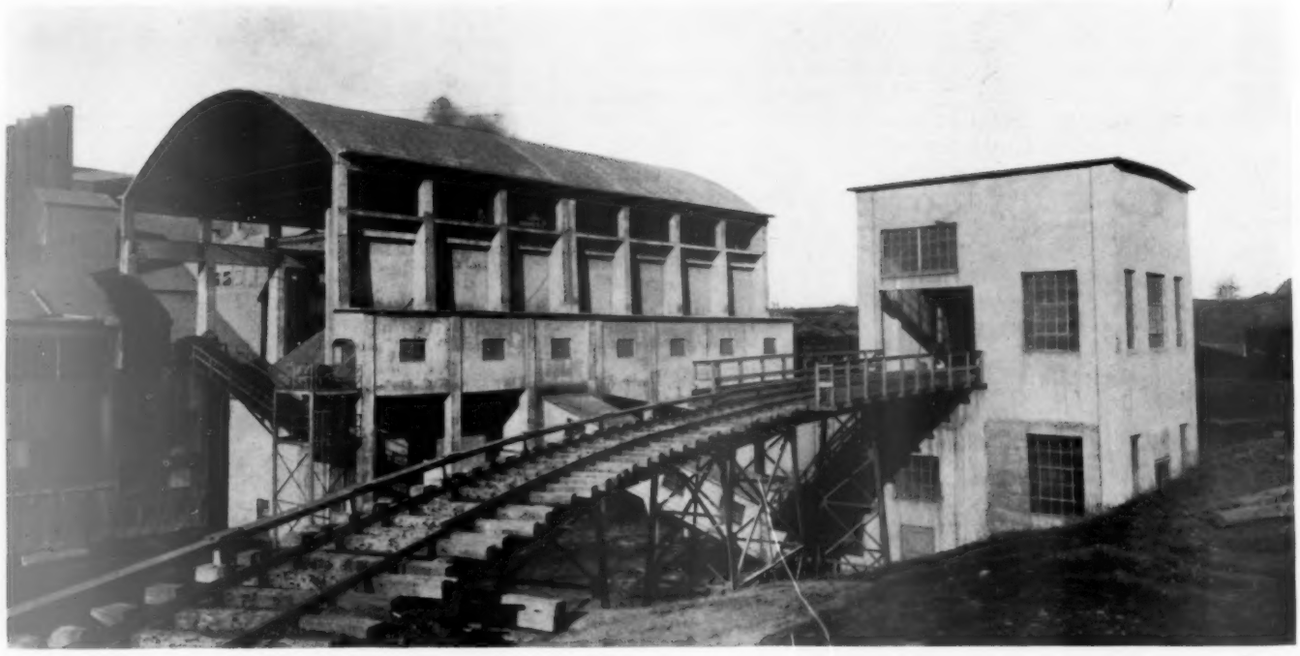
Those who seem best informed, and who have the most sober judgment, seem to believe that many amendments will be offered to the Robinson-Patman Act in the next Congress, and that many of them would make the law much more drastic than it is at present. It is believed the President and those who really helped to formulate the law fully realize that it is what might be called a "botch," but that they were willing to allow it to come into being in its present extreme form in order to draw fire. After the law has gone through the courts, and has run the gauntlet of amendments in Congress, it will be polished to a finish that will probably approximate something of what everybody wants. A man who knows the technic of New Deal procedure predicts that toward the end of the session of the Congress an amendment will be offered to the Robinson-Patman Act that will make it thoroughly workable and much more acceptable. At the same time an appropriation will be provided that will enable the Federal Trade Commission to enfore the law effectively.

In the meantime, however, Congress will undoubtedly p r o v i d e sufficient funds to continue to enforce the act. And that part of Commissioner Freer's statement which emphasizes the beauty of conferences about trade practices under the supervision of the Federal Trade Commission should by no means be overlooked. Indubitably the Government would rather bring trade groups together to work out programs of fair competition by voluntary coöperation than to force them to do so by civil and criminal prosecutions. It is obvious that this system is in keeping with the general plan of the administration to organize all units of the population to function coöperatively within their spheres for the good of the whole. And unless all signs fail, contrary to opinions held in some substantial quarters, it appears quite likely that the Federal Trade Commission will continue to be the agency to bring about this result. There are many indications that the commission is actively proceeding with complete assurance to build its organization into something much broader and larger than now exists. At the present time it spends roughly $2,000,000 annually. Besides the headquarters in Washington it maintains offices in New York City, Chicago, San Francisco and Seattle.

It has been suggested that the so-called Roper Advisory Business Council composed of members of fundamental and heavy industries, and the Berry Industrial Council composed of representatives of labor and smaller business interests, might have a material political effect upon the eventual modification of the Robinson-Patman Act. There also is talk about the influence of Senator O'Mahoney's campaign to secure the enactment of a Federal Corporation Act, and of the proposal of the United States Chamber of Commerce that the regulation of business should be passed back in greater measure to the 48 states. However, it seems very unlikely that these measures will affect the plans of the administration so far as the Robinson-Patman Act is concerned. Nor does it seem likely that such proposals will have much effect upon Congress itself unless the proposals are approved by the President. The thought is almost unanimous that this Congress will follow the President's leadership even more enthusiastically than the last Congress followed his lead during the first four years.

By ERNST GRUENWALD
Engineer, Incor Division
Lone Star Cement Corp.

Winter Weather No Handicap in Erection of Concrete Structures



Storage and crusher buildings as completed at Nazareth, Pa., plant of Lone Star Cement Corp.

IN spite of sub-freezing temperatures that prevailed last winter a program of modernization was carried out on a summer construction schedule at the Nazareth, Pa., plant of the Lone Star Cement Corp. The work consisted of a new crusher building, 31 ft. by 29 ft. in plan and 51 ft. high, and a rock-storage building roofed with a 79-ft.-span parabolic concrete arch. The work was performed by the M. A. Long Co., under the supervision of E. C. Machin, general manager of its Allentown division.

Skillful forming, adequate heat protection and the use of high-early-strength cement made it possible to complete the work on a fast summer schedule. A definite saving in heat protection expense was the feature of this winter job. Also noteworthy was the use of the sliding-form method on the crusher building as well as the production of tapered concrete retaining walls with counterforts in the storage building. The methods used will be of interest to cement manufacturers and other nonmetallic-mineral producers contemplating the election of new buildings.

Purpose of Building.—This work was part of a continuing program that is integral with Lone Star Cement Corp. policy; to provide the most modern equipment and maintain the highest possible plant operating efficiency. The new crusher installation allows more economical processing of the raw materials as they come from the quarry, while the new storage facilities provide a reservoir for the crushed product ahead of the raw-grinding department. This storage not only allows greater flexibility in quarry operation and economies in material handling but enables the chemist to maintain an accurate mix control.

Structural Design.—The new buildings were designed by Lone Star's engineering department; the detailed plans were prepared by the M. A. Long Co.

The storage building is 75 ft. wide, 114 ft. long and 76 ft. high from the top of the footings to the crown of the arch-roof. An expansion joint divides the building longitudinally into two sections, 49 ft. and 65 ft. long, respectively. Storage space is formed by retaining walls 25 ft. high. The south inclosure is a cantilever retaining wall.

A tunnel, housing the belt-conveyor used to transport the crushed rock from storage into the mill buildings, forms an integral part of the north retaining wall. The east and west inclosures are counterfort retaining walls, with counterforts spaced at 16-ft. intervals. Counterfort columns are carried above the retaining walls to support the crane beams and the concrete roof. An inclined conveyor gallery forms a part of the east wall.

The reinforced-concrete parabolic arch-roof has a 79-ft. span with a 16-ft. rise. The roof is 6 in. thick at the crown and 12 in. thick at the spring line. The eaves are figured as horizontal girders to take the horizontal thrust of the

Construction view showing tarpaulins in place.

arch. They are supported by 20-in. by 24-in. columns every 16 ft., where two 2¼-in. tension rods pick up the total thrust. A sliding bearing is provided on the east columns and a fixed bearing on the west columns.

Construction.—E. C. Machin, the general manager of the Allentown division of the M. A. Long Co., realized from the outset that economical construction of the rock-storage building depended primarily on an efficient handling of the form problem. While his company has had wide experience with sliding forms, the counterfort, tapered retaining walls and conveyor bridge in this structure presented unusual problems.

The expansion joint which divides the building made it logical to erect the structure above the foundations in two steps. After the foundations were placed the north part of the building was formed and poured. Stationary forms were used to the top of the cross tunnel; sliding forms from the top of the tunnel to the top of the crane beam.

The pouring of the retaining walls in the north section was started October 19 and completed October 21. Two days were required to change the forms for the columns and curtain walls of the superstructure. Lone Star Portland cement was used to this point. Then, in order to speed the completion of the craneway girders and the columns and beams of the roof supports and begin work on the south section at once, "Incor" 24-hr. cement was used. The forms were removed from the roof-support column 4 hr. after the concrete was poured, so the tops of the girders could be troweled smooth. The forms from the craneway girder and beams were stripped within 24 hr. after pouring, and the sliding-form units were at once transferred to the south section.

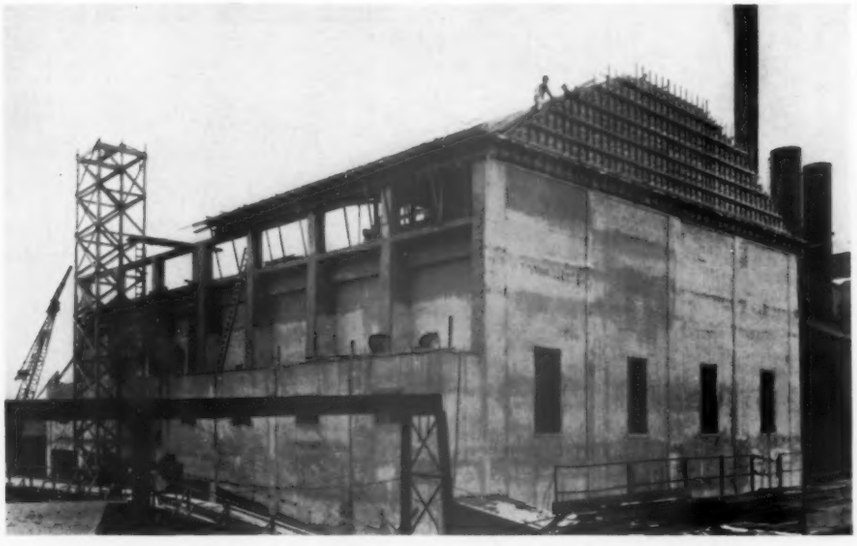
"By using 'Incor' cement we saved a week to ten days on this part of the job," said Mr. Machin. "After considering the advantages of high-early-strength cement, we decided to use it on the entire south section, especially because it would be mid-November before we would be ready to start pouring on this section, and weather conditions would be undependable. Temperatures were low and the setting of concrete would, of course, be retarded. Then, too, we were pouring this second section against the expansion joint, and this would have been difficult if the concrete had not set up properly. In pouring green concrete against a fixed object, the green structure has a tendency to draw away from the fixed object, if it does not set properly. Taking all these factors into consideration, we decided to use 'Incor' cement in this south section, and had very good results. The concrete seemed to be more dense and it set up quickly, even under adverse weather conditions, enabling us to proceed with our work without a single hitch. After reaching the elevation of the craneway girder we poured the girder, columns and beams monolithically, the same as in the first section poured."

Roof Construction.—When the work was completed to the roof support at an elevation of 153.50 ft., the contractor proceeded with the parabolic arch-roof construction. Afraid that ordinary cement would not attain service strength in time to carry the heavy loads necessary in pouring the arch-roof, he used "Incor" on the craneway beams and roof-supporting beams. This made it possible to proceed with the roof construction without delay. The steel

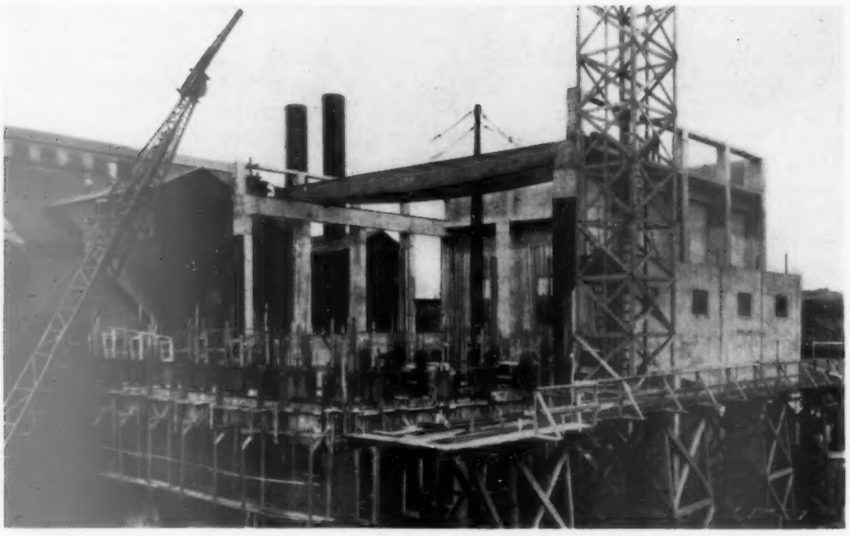
Another view of the storage building under construction.

girders for the traveling crane were put in place as soon as the crane-way beams were completed. A supporting tower was constructed under the crane girders (to increase its carrying capacity, to support the frame and green concrete), and a concrete hoist tower built and connected with it. Both towers were on steel rollers. Form segments previously cut and framed on the ground were then erected on the top of the crane girders. When the roof forms were moved, the crane girders and tower were moved as a single unit carrying the form with it. A working platform was constructed to the elevation of the beams supporting the arched roof. Interference of the tension rods and their supporting members made it necessary to construct the movable framework in three sections, designed so that hardwood wedges could be used to raise and lower the framework to the required position.

Cold-weather Concreting. — The forms were designed so as to allow pouring the roof in seven sections. Protection from anticipated temperatures of 14 to 15 deg. above zero was provided by tarpaulins attached to the forms, with flues leading from the salamander-



The storage building with forms in place for pouring the reinforced-concrete arched roof.



An early construction view showing reinforcing steel and forms in place.

heated working platform to the top of the forms where concrete was being poured. Pouring of the first section began December 10. Although the outside temperatures went as low as 10 deg. F., temperatures within the inclosure were never below 36 deg. during the roof construction and averaged 44 deg.

The cost of heat protection, including fuel and fire-tending labor, amounted to $15 a day. The use of "Incor" cement saved 49 days in the roof construction, or $735 in heat-protection costs.

Control Tests.—The stripping times were determined by control cylinders poured with each section. Concrete strengths were closely checked by cylinder tests, and in every instance but one it was possible to move the forms forward for the next section within two days of pouring.

Twelve test cylinders were made for each of seven roof sections. Four or six cylinders from each section were stored on the job, half under and half above the roof, for testing at 1, 2 and 3 days. The remaining cylinders were stored in the outside air—two for testing at 7 days, one for testing at 28 days, one for testing at 6 months.

Complete records of concrete and air temperatures were kept; test results are given in the table below.

Proportioning and Field Control.—In selecting the mix both durability and strength were considered. Concrete specifications for the heavy substructure called for a minimum cement content of 5¼ bags per cu. yd., with a maximum water content of 7½ gal. per bag. The concrete for the roof contained a minimum of 6 bags of "Incor" high-early-strength cement per cu. yd., with 6½ gal. of water per bag.

By trial mixes the cement content was adjusted to provide the desired workability with the minimum permissible water content. Delaware sand and gravel meeting Pennsylvania Highway Dept. specifications were used for aggregate. The sand had a 2.65 fineness modulus, a specific gravity of 2.65, and weighed 108 lb. per cu. ft., dry-rodded. The gravel was coarse, having a 7.46 fineness modulus, a specific gravity of 2.64, and a dry-rodded unit weight of 94 lb. per cu. ft.

Trial mixes, proportioned by weight, resulted in the following batch proportions:

	Mix for Heavy Walls	Mix for Thin Walls	"Incor" Mix for Roof
Cement ..... *lb.*	376	423	470
Sand ..... *lb.*	880	880	800
Gravel ..... *lb.*	1,520	1,520	1,750
Cement..... *bags per cu.yd.*	5¼	5¾	6.15

The concrete was batched by volume, the batching hopper being calibrated to the above weights. A correction was made for approximately 9 per cent. moisture in the sand. The water added was carefully measured, adjustments being occasionally necessary to take care of variations in the moisture of the aggregates, in order to maintain the desired workability.

Mixing and Placing.—A Ransome mixer of ¾-cu. yd. capacity with the drum revolving at 18 r.p.m. was used; each batch was mixed at least 2 min.

(Continued on page 107)

The use of high-early-strength cement made a fast construction schedule possible.

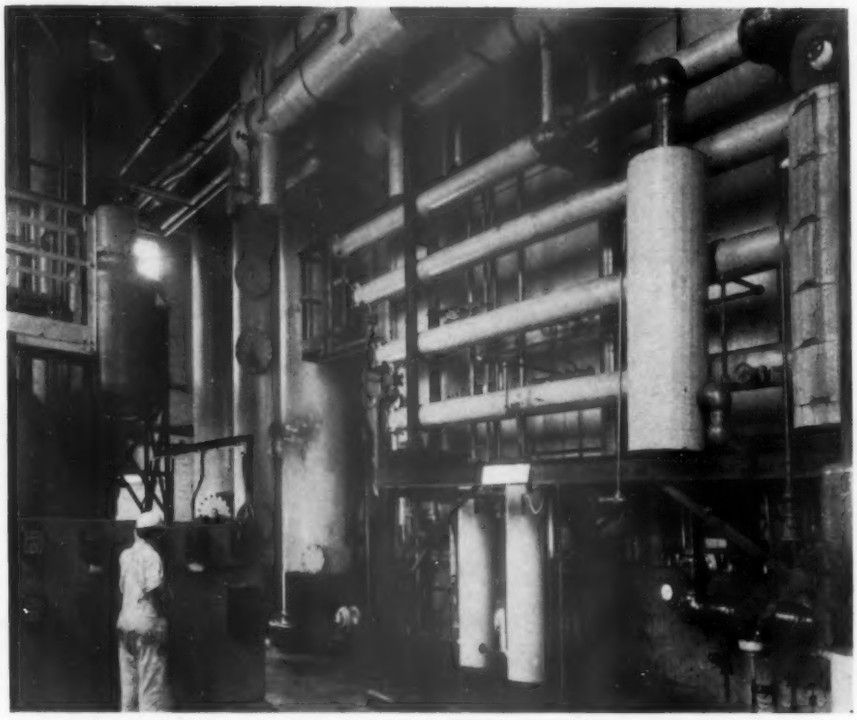
TEST RESULTS FOR 1, 2, AND 3 DAYS

Sec.	Date of Pour	Air Temp. High	Air Temp. Low	Slump (in.)	1 Day Above Forms Temp.	1 Day Above Forms Stgth. (lb.)	1 Day Below Forms Temp.	1 Day Below Forms Stgth. (lb.)	2 Days Above Forms Temp.	2 Days Above Forms Stgth. (lb.)	2 Days Below Forms Temp.	2 Days Below Forms Stgth. (lb.)	3 Days Above Forms Temp.	3 Days Above Forms Stgth. (lb.)	3 Days Below Forms Temp.	3 Days Below Forms Stgth. (lb.)
1	12/10/35	42°	38°	2	45°	1,270	59°	2,160	46°	2,530	50°	2,428	41°	3,364	45°	3,234
2	12/15/35	40°	39°	2	42°	1,120	67°	1,975	40°	2,125	52°	3,116	35°	2,444	44°	3,445
3	12/19/35	42°	33°	1½	46°	1,232	78°	2,141	36°	2,226	49°	2,484	20°	2,817	49°	3,233
4	12/22/35	28°	15°	3	.....	486	.....	1,186	48°	1,824	58°	2,585	50°	2,841	53°	3,658
5	12/28/35	24°	10°	3	.....	285	.....	996	41°	937	57°	1,990	14°	1,900	36°	3,519
6	1/ 1/36	30°	20°	2½	.....	2,189	.....	2,115	60°	3,000	65°	2,702	.....	3,485	.....	3,630
7	1/ 4/36	42°	34°	3¼	.....	960	.....	1,775	54°	1,710	61°	2,490	.....	2,062	.....	2,596

TEST RESULTS FOR 5, 7, 28 DAYS AND 6 MONTHS

These cylinders were stored in air outside the laboratory. The temperature range during period of exposure is noted under strength.

Section	Slump (in.)	Compressive Strength (lb.) 5 Days	7 Days	28 Days	6 Months
1	2	3,960 46°—32°	4,820 46°—27°	6,140 46°—8°	No Test
2	2	4,210 42°—19°	5,690 42°—15°	6,175 43°—8°	7,110 92°—4°
3	1½	4,076 42°—15°	5,460 42°—12°	5,625 43°—8°	6,826 92°—4°
4	3	4,088 28°—12°	4,410 28°— 8°	5,080 43°—8°	6,358 92°—4°
5	3	3,260 30°— 8°	4,355 36°— 8°	5,035 43°—4°	6,890 94°—4°
6	2½	4,005 43°—20°	4,285 43°—20°	4,965 43°—4°	5,208 94°—4°
7	3½	3,200 42°—30°	4,160 42°—30°	5,205 42°—4°	Cylinder Damaged



View showing typical purification and liquefying equipment.

Much of Present Dry-Ice Output Is Produced from Waste Gases

By W. N. NEIDIG
Engineer, The Lummus Co.

THE continued development of the uses of dry ice during the past few years has resulted in renewed search for cheap raw material in order to meet the increasing demand for this valuable product. Waste gases from distilleries and lime kilns are the principal sources of raw material now being used for the production of liquid carbon dioxide and dry ice since they are the lowest-cost raw material available in most localities. About 75 per cent. of the dry ice consumed in the United States is produced from waste gases from these sources.

Although a comparatively new commercial product, the consumption of dry ice has had a gradual and consistent growth during the past few years. New uses are continually being found, as the unusual properties of dry ice become more generally understood and equipment is developed for the economical handling and use of the product. The recent developments in equipment for the efficient use of the product assure a continued increase in consumption.

In appraising the value of waste gas from a lime or cement plant for the production of dry ice the important items of consideration are location, the purity of the waste gas, and the cost of power and services available.

The principal items of cost in the manufacture of dry ice are raw material, power and labor and it is logical to look to the rich waste gases from the lime and cement industry, where steam and power are available at low cost, for the development of new production capacity. Waste-gas recovery plants can be installed without interference with the operations of the lime or cement plant and the dry-ice plant can be operated as an additional department of the present business.

The technical problems of purifying and concentrating carbon dioxide from waste lime- and cement-plant gases have been solved for most types of impurities found in the raw materials and the matter of handling a given raw material is primarily an economic problem. The converting of the purified gas into merchantable dry ice is carried out in standard manufacturing units producing the commercial size block 10 in. by 10 in. by 10 in. weighing about 50 lb.

The methods of purifying the waste gas and manufacturing dry ice have undergone rapid advancement during the past several years. Much of this advancement is covered by new patents on processes and devices which are improvements in the art. Equipment including these improved features, which will give a lime or cement manufacturer entering this field a modern low-operating-cost plant and protection against interference of patents of others, is available.

Description of Process.—The amount of carbon-dioxide gas in a waste gas and the quantity and type of impurities present in the gas are important factors affecting the capital investment and operating costs of a plant.

In the well-known type of coke-burning plant a special grade of coke very low in sulphur is burned for the production of the raw gas and to furnish part of the power required for stripping the gas and converting it into dry ice. The raw coke gas contains from 16 to 18 per cent. of carbon dioxide and the impurities that must be removed vary with the grade of coke burned.

In many lime- and cement-burning processes the raw gas contains from 25 to 35 per cent. of carbon dioxide, which requires gas stripping and concentrating equipment of considerably smaller size than is needed for a given capacity starting out with 16 per cent. of carbon dioxide in the raw material. Plants equipped to recover waste heat from the kilns and utilize it for the production of this by-product are in a position to produce dry ice at very low manufacturing costs. The impurities in the raw gas from a lime or cement plant are inherent with the raw materials and fuel used. In most cases the handling of these impurities is a minor consideration both in the equipment required and in operating costs.

The gas-stripping and concentrating process employs equipment to purify and absorb the carbon dioxide in a chemical solution and to drive off the

concentrated gas at about 99 per cent. carbon dioxide in a continuous cycle. This equipment is usually placed outdoors with housing only for the pumps and instruments.

The concentrated gas is compressed and liquefied and converted into dry ice in pure, dense, hard, white blocks of granular structure, so that the product can be sawed into thin wafers and small pieces without the waste resulting from brittleness or irregularities in shape. The dry ice is produced in the standard commercial size blocks already mentioned.

The cost of operating the gas-purifying and concentrating equipment and the dry-ice manufacturing process is largely the cost of the power available.

Efficient steam-driven and electrically-driven manufacturing units have been developed in 10-ton, 25-ton and 50-ton per 24-hr. day sizes with the binary manufacturing cycle. This cycle is built with two-stage carbon-dioxide compression and ammonia-cooled liquefying condensers with a maximum operating pressure of about 400 lb. gage. The building space required for the manufacturing equipment and for packing and shipping space is about 2,000 sq. ft. for a 10-ton plant. A 25-ton plant can be installed in an area of about 3,000 sq. ft.

The dry-ice manufacturing equipment is designed in a large measure for automatic operation. The plant can be supervised by the present lime- or cement-plant forces and the additional workers required are only machine operators and snow-press men. A plant producing at the rate of 10 tons per day requires only 2 men per shift and a 25-ton plant 3 men per shift for the operation of the complete gas-stripping and dry-ice manufacturing equipment.

Location.—The value of a waste gas as a raw material for the production of dry ice depends principally on the location of the waste gas with respect to the markets for the product. A waste gas reasonably free from dust, sulphur compounds and gaseous hydrocarbons and containing a high percentage of carbon-dioxide gas can be efficiently purified and concentrated. If waste gas of this type is available with low-cost power, the conditions are most favorable for the design of a dry-ice plant for low-cost production.

Low-cost production is an important factor in the financial success of a dry-ice plant or in any other business. However, it is not the only consideration necessary for a profitable dry-ice business. The present market and the potential market for the product in the vicinity of the plant are the most important factors.

Dry ice is not a product that lends itself to cheap long-distance distribution. Special insulated equipment is necessary for shipment of the product, and when it is distributed over long distances, the distribution costs may be as great as or greater than the manufacturing costs. In general, it may be said that efficient distribution is often a more important factor in the industry than low-cost production.

The future growth of the industry will undoubtedly be served by the construction of strategically located plants that can sell their production within easy truck-hauling distance and using the cheapest raw material available in the locality. In many localities waste lime- or cement-plant gas is the cheapest available raw material.

Purity of the Waste Gas.—The high standards of purity established for commercial dry ice have in a large measure been responsible for the remarkable growth of the industry. Commercial dry ice must be colorless, odorless and without traces of oil or other impurities. It is used as a food product and as a refrigerant in direct contact with food products and any trace of impurity will make it unfit for these applications. Its use for its chemical properties in the manufacturing and chemical industries also requires a pure commercial product.

The composition of the raw material and of the fuel used in the lime- or cement-burning processes determine the quantity and type of impurities that must be handled in the gas-stripping and purifying processes. Plants that are now operating dust-collecting equipment on their discharge gas and are recovering most of the dust being carried out with the waste gas can install at low cost final cleaning equipment for completely eliminating the dust from that part of the gas used for dry ice.

The nitrogen and oxygen contained in the raw gas offer only minor problems in the design of the stripping equipment, since these gases are inert with respect to the absorption solution and are finally discharged from the stripping process as waste material.

Sulphur in any form requires careful consideration in the design of purification equipment. Some sulphur compounds can be readily taken out of a raw gas and others require more careful treatment. It is necessary to eliminate all traces of sulphur from a gas before converting it into commercial dry ice, since a trace of sulphur in the form of SO_2 or H_2S carried into the final product will be readily detected and will make the product unfit for use in many applications.

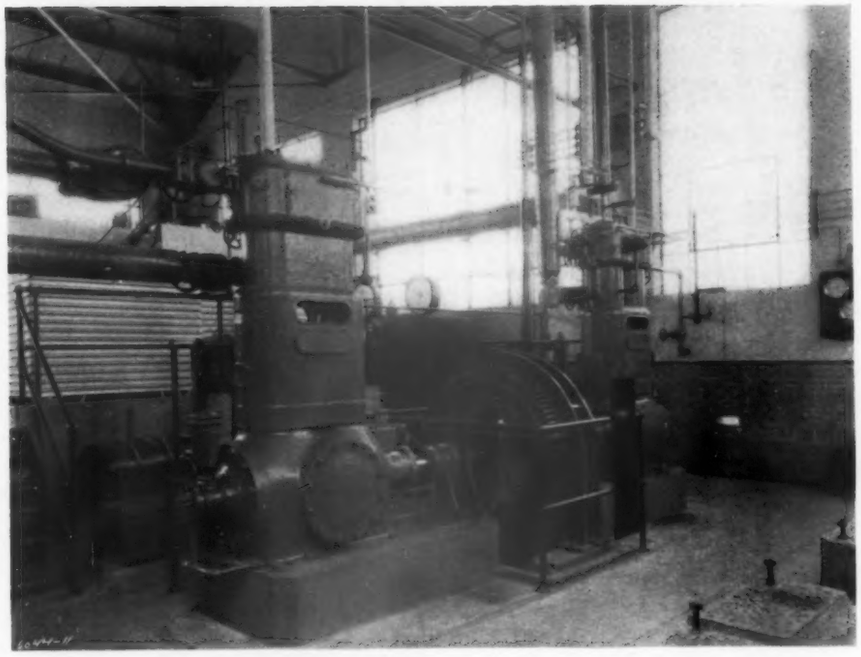
Power.—Raw material, power and labor are the important items of direct operating costs to be considered in the investigation of a location and in the detail design of a plant for the production of dry ice.

A lime or cement plant having waste gas available can install a dry-ice plant as an additional department and furnish the raw material at no cost. The labor required for a modern efficiently designed plant of a given size is more or less a fixed item varying somewhat with local conditions.

Power in the form of steam, or steam and electricity, is recovered from waste heat in many cement plants and a cement plant having waste heat that can be utilized for the operation of a by-product dry-ice plant is in a favorable position to produce a low-cost product.

The waste-heat equipment of a

Finished dry ice leaving the block-forming machine.



This compression unit has a capacity of 10 tons per 24-hr. day.

cement plant that is designed to produce steam at 150-lb. pressure or above will provide ideal conditions for the installation of steam-driven dry-ice manufacturing equipment. With the steam-engine compressor drive arranged for operation at about 15-lb. exhaust pressure the raw-gas stripping and concentrating process can be operated from the engine exhaust, which will reduce the dry-ice production costs to principally labor and supplies.

A steam-driven plant of this type designed for a steam balance of the mechanical power required for the manufacturing cycle and the exhaust steam used in the gas-stripping and concentrating process and arranged for automatic control will result in a plan of high over-all efficiency.

Uses of Dry Ice.—Dry ice has a well-established position in the refrigeration field and is undoubtedly headed toward extensive expansion in this field in the coming years. Its cleanliness and dryness and its ability to hold low temperatures economically for many uses have opened up many new applications for the product.

Dry ice is the most efficient refrigerant known for motor-truck body refrigeration; it is clean and dependable and results in the lowest over-all truck capital investment and operating costs. Its use for truck refrigeration is growing rapidly.

Dry ice has brought in a new era in the handling of frozen products, sea food and specialties with the recent development of economical and handy packages, containers and display cabinets.

Dry ice has developed a wide field as a gas for modifying cold-storage atmospheres for the shipment and storage of food products and as a pure low-cost chemical product for use in industrial and chemical manufacturing processes.

Dry ice can be transported and handled more cheaply than liquid carbon dioxide and its use for charging converters is growing rapidly for supplying the demand for the product where it is used in the liquid and gas forms.

The technical problems of the low-cost production of dry ice, which some years ago held back the development of the industry, have been solved for most types of waste gas and the dry-ice industry is now approaching a period of rapid expansion. This expansion will be greatly accelerated by low-cost producers marketing their product direct to consumers in localities within truck-hauling distances of their plants at prices which will encourage the use of the product in the many industrial and refrigeration fields for which it is so well adapted.

The growing market for dry ice offers an opportunity for profit to the lime or cement plant equipped for low-cost production and located where the product can be delivered to the consumer by trucks hauling direct from the manufacturing plant. The production of dry ice by the lime and cement industries is due to become in the near future an important factor in the development of the dry-ice industry.

Lone Star *(from page 104)*

Placing the concrete presented no unusual problems and was handled in the customary manner. No chuting was permitted, with the exception of the storage building's northwest gable wall. Concrete was transported direct to its final resting place, where it was spaded and rodded. The slip-form method allowed the use of relatively dry concrete placed in shallow layers. No segregation of the material was noted, and concrete free from honeycomb was obtained throughout. On slip-form units a finisher's scaffold was attached to the moving form, and the concrete was finished off as the slip forms were raised.

In pouring the roof a shallow layer of 4-in.-slump concrete was deposited first so as to embed the bottom reinforcing of the arch and avoid any honeycomb on the underside of the roof. This first layer was followed by stiffer concrete of 1½-in. to 2½-in. slump. The concreting was done simultaneously from the eaves on both sides toward the center of the roof. At the steep part of the roof, 1-in.-slump concrete was used.

Rock-Crusher Building.—The crusher building, simple in design, was estimated solely in concrete, and ordinary Portland cement was used in its construction. This building was built with slip forms. Inserts at various floor levels provided the required bearing for the floors, which were poured after the walls were erected. Steel-sash windows were set in place and concrete poured around them. The slip forms were used from the top of the sub-basement to the roof for a height of 48 ft. Pouring began September 23 and the top of the walls was reached on the 26th. Instead of the 1:2:4 mix formerly used by the contractor in such work, a 5¾-bag mix, using cement with well proportioned aggregate was designed and proved eminently successful, as indicated by the progress of the slip form of 16 ft. per day.

Novel Building Campaign

A "buy a bag of cement" campaign is under way in the drive to raise funds for the construction of the $75,000 stadium at Southern Teachers College, Carbondale, Ill. With the excavation completed the pouring of concrete is scheduled to start soon and the college is seeking ways to complete its portion of more than $15,000 of the cost. The rest of the money is a WPA grant and WPA labor is building the stadium.

Alumni, faculty and student contributions total $6,000. The "buy a bag of cement" campaign is a request to everyone wishing to support the project to donate $1.

Calaveras Cement Co. Installs Dust System

IMPROVEMENT WILL COST $110,000

The Calaveras Cement Co. has awarded a contract for the design and construction of a Cottrell electrical precipitator to extract dust from the exit gases at the two kilns of the company's cement plant at San Andreas, Cal., to the Western Precipitation Corp. at Los Angeles, Cal.

Work on installing the equipment which is said to cost in the neighborhood of $110,000 was started in December.

In connection with the improvements at the Calaveras plant Supt. R. H. Townsend reports that the company is preparing to produce Portland-puzzuolan cement in the near future.

Lime Industry Mourns Passing of Two Leaders

Two well known executives in the lime industry in the northwest passed away recently. S. W. R. Dally, president of the Orcas Lime Co., Seattle, Wash., succumbed to a protracted illness at the age of 76. Falling from one of his company's vessels to a dock caused a skull fracture which resulted in the death of R. F. Mather, vice-president of the Pacific Lime Co., Ltd., Vancouver, B. C.

Canada Cement Disposes of Three Power Plants

The Canada Cement Co., Ltd., recently sold its three small hydro-electric power plants on the Ontonabee River near Lakefield, Ont., to the Ontario Hydro-Electric Power Commission. The three plants have a maximum capacity of 4,200 hp.

California Business Men Visit Monolith's Plant

More than a hundred Bakersfield, Cal., business men were guests of Coy Burnett, president of the Monolith Portland Cement Co. on a tour of the company's plant near Tehachapi recently. Following a trip to the plant and quarry Mr. Burnett and his brother, W. D. Burnett, vice-president of the cement company, were hosts to the visitors at a banquet.

Asbestos Firms Announce Improvements to Plants

★ Improved conditions in the building industry caused two asbestos-manufacturing firms to announce two plant-improvement programs recently.

The Kenilworth Mfg. Co., producing asbestos-cement shingles and siding, is equipping a $500,000 plant at Kenilworth, N. J. The buildings were formerly occupied by the American Can Co.

At St. Louis, Mo., the Ruberoid Co. is just starting the erection of a $250,000 addition to its existing plant, where asbestos shingles are manufactured.

TVA Geologist Reports Flexible Sandstone Find

Flexible sandstone, the first to be discovered in the United States, has been dug up by Charles Hunter, junior TVA geologist, in Forsyth County, North Carolina, it is reported. The only other known deposits are said to be in Brazil and India. The material has alternating layers of mica flakes and sand grains which give it flexibility. Its only value is said to be as a novelty.

Huron to Build Cement Warehouse at Muskegon

★ The Huron Portland Cement Co., Detroit, Mich., is preparing to erect a bulk-cement warehouse and packing plant at Muskegon, Mich., including reinforced-concrete storage silos with a capacity of 60,000 bbl. The contract is expected to be awarded shortly.

Lumber Dealer Acquires Arkansas Gravel Plant

The plant and physical assets of the Hudson Sand & Gravel Co., Batesville, Ark., were sold recently to the Roy N. Jeffery Lumber Co. of Batesville, which will continue to operate the concern as a subsidiary.

Connecticut Gravel Firm Enlarges Its Operations

The Stamford Local Material Co., Stamford, Conn., with plant at Glenbrook, Conn., recently purchased the gravel plant of Mills Bros. at Norwalk, Conn., and is continuing its operation.

Indiana Engineers Are PCA Banquet Guests

The Portland Cement Assn. entertained the members of the Indiana section, American Society of Civil Engineers, at a banquet during the section's autumn meeting held at Hammond, Ind., recently.

Port Huron Cement Mill Is Being Reconditioned

The Port Huron, Mich., plant of the Peerless Cement Corp., is being reconditioned preparatory to being reopened. The mill had been idle for several years.

Award Silver Medal to Charlie Johnson

WHITE-CEMENT PIONEER HONORED

Last month when Blaine S. Smith, newly-elected president of the Universal Atlas Cement Co., presented a silver medal to Charles L. Johnson, it not only marked his completion of 25 years of service in selling white cement but also his more than 44 years' continuous service in the cement industry.

Back in 1892, as a young boy in Sandusky, O., Charlie Johnson, as thousands of people in the construction field call him, entered the cement business

Mr. Johnson receiving medal from Pres. Smith (right). Witnessing the presentation are R. B. Hynes, secretary; P. F. Keatinge, mgr., white-cement dept.; and T. E. O'Connor, treasurer.

and has been in it ever since. It is the only job he has ever known. He worked his way up to become sales manager of two important cement companies but liked the first-hand human contacts with people in the field so much that he relinquished his executive positions to concentrate on direct selling and promotional work.

When the manufacture of Atlas White cement was begun a little more than 25 years ago, Charlie sold the first barrel. He has seen sales increase from nothing to more than 500,000 bbl. a year and has himself made sales ranging all the way from a few barrels to a Texas dealer in the early days to more than 5,000 bbl. for the Nebraska Capitol.

He opened and developed the California market for white cement and that field now is one of the largest users of the product for stucco, terrazzo and other decorative uses in the residential field and for use in white traffic markers.

Charlie Johnson has sold white cement in every state in the Union and in every important city in the United States and Canada and is credited by his associates with knowing more architects than any other man in the country.

Three Plants Suffer Damage Due to Fires

ESTIMATE LOSSES AT $150,000

The old packing plant of the Marquette Cement Mfg. Co. suffered considerable damage recently when fire of unknown origin attacked the structure. Hundreds of cloth bags were destroyed. The rest of the buildings at the plant which are of more recent construction are built of steel and concrete and were, therefore, safe from damage.

The barite-grinding plant operated by the Thompson-Weiman Co. near Cartersville, Ga., was destroyed by fire recently. The damage was estimated to have reached nearly $100,000. Included in the loss were eight freight cars loaded with barite ore.

Fire caused damage estimated at $35,000 recently when it partly destroyed the sand-and-gravel dredge owned by Dillman Industries, Inc., Caruthersville, Mo. The company operates on the Mississippi River.

Hails Soil Stabilization As Greatest Development

With a nationwide survey of soil-stabilization conditions underway, the future prospects for the construction of a large mileage of roads of this type are attracting the attention of many road-builders and producers of materials. The first broad program of building this type of road will probably get underway in Michigan next year.

Thomas H. MacDonald, chief of the U. S. Bureau of Public Roads, recently characterized the soil-stabilization method as "the greatest discovery in road construction in years."

Pennsylvania Producers, Equipment Men Gather

A joint meeting of the Pennsylvania Stone Producers' Assn., and equipment manufacturers' representatives was held Dec. 16 at the Penn Harris Hotel. Subjects discussed were stone sand, crushed-stone grit as an anti-skid material for bituminous pavements and a report was heard on the relative value of stone and gravel concrete for highways.

Boase Reports Amusing Incident on Continent

A. J. Boase, manager of the structural bureau, Portland Cement Assn., who recently returned from a European trip where he made a study of concrete in architecture, reports that the trip was not without its adventuresome moments. Mr. Boase took hundreds of photographs and, while shooting an exceptionally fine bridge job in France, aroused the suspicions of a French army major. Said major had a hunch that Mr. Boase might be a German spy and had him clapped into irons and kept incommunicado for about seven hours. Mr. Boase eventually talked his way out of the "hoosegow" without seeking aid of the American consular service.

Shiely Employees Given Christmas Bonus Checks

Seventy-five employees of the J. L. Shiely Co., aggregates producer and dealer in ready-mixed concrete at St. Paul, Minn., received Christmas bonuses totaling about $7,000.

The gifts were in the form of checks which amounted to 10 per cent. of a year's wages for each worker who had been with the firm 10 years or more. For employees who had been with the company a shorter period of time the bonus was smaller in proportion to the number of years worked.

Massachusetts Producers Purchase Diesel Engines

★ Two Massachusetts crushed-stone firms recently installed Diesel equipment, according to the Andrew-Myerson Corp., Boston, Mass., which sold the engines. The West Roxbury Trap Rock Co., West Roxbury, Mass., installed two Fairbanks-Morse Type Y engines of 360 and 180 hp. At the plant of the Massachusetts Broken Stone Co., a 562-hp. Worthington Diesel was installed to supplement the service of a 240-hp. Fairbanks-Morse Diesel engine which went into service nearly two years ago.

Lehigh May Reöpen Old Alsen, N. Y., Cement Mill

The cement plant at Alsen, N. Y., owned by the Lehigh Portland Cement Co., which has not been in operation for some time, may be rebuilt in the near future, according to reports.

The plant was originally owned and operated by the old Alsen Cement Co., one of the first producers of natural cement in the country.

Detroit Builder Plans Yale, Mich., Gravel Plant

The George Construction Co., Detroit, Mich., has acquired a sand-and-gravel deposit near Yale, Mich., paying $13,000 for the property. A modern washing-and-screening plant is to be built shortly, it is reported, with storage facilities for handling about 3,000 cu.yd. of material.

Initial Walsh-Healey Act Contracts Listed

LABOR DEPT. REPORTS PURCHASES

Generally regarded as the forerunner of later Federal statutes which will reinstate labor provisions of the National Industrial Recovery Act, the Federal government has placed its first orders under the Walsh-Healey Act for purchase of sand, gravel, crushed limestone and allied products, the U.S. Labor Department has announced.

The purchases announced employ for the first time the provisions of the Walsh-Healey Act, which provides that successful bidders on government contracts must stipulate that they will employ, in the production of such orders of $10,000 or more, minimum wages, maximum hours, and other labor conditions dictated by the government.

The contracts announced include:

SAND: Moulding - Brownell Corp., Chicago, Ill., $15,750; Ray Sand & Gravel Co., Detroit, Mich., $12,690.

LIMESTONE: Adam Eidmiller, Greensburg, Pa., $26,285.50; Material Service Corp., Chicago, Ill., $11,696.50 and $29,930.26; Moulding-Brownell Corp., Chicago, Ill., $26,724; Consumers Co., Chicago, Ill., $48,878; Dolese & Shepard Co., Chicago, Ill., $15,826; Columbia Quarry Co., St. Louis, Mo., $10,860.

GRAVEL: D. F. Jones Construction Co., Inc., Little Rock, Ark., $15,000; Catsman Coal Co., Flint, Mich., $17,400.

SLAG: The Buffalo Slag Co., Inc., Buffalo, N. Y., $21,300.40.

RIPRAP: Basalt Rock Co., Napa, Cal., $19,500 and $22,000.

CONCRETE PIPE: Shearman Concrete Pipe Co., Atlanta, $65,060.16; Detroit Hume Pipe Co., Detroit, $11,925; Lamar Pipe & Tile Co., Grand Rapids, Mich., $11,550; American Concrete & Steel Pipe Co., Los Angeles, Cal., $24,110.05; Illinois-Wisconsin Concrete Pipe & Tile Co., Chicago, Ill., $15,509.70 and $10,857.70; Lock Joint Pipe Co., Clearing, Ill., $41,664.20; Independent Concrete Pipe Corp., Inc., Lockport, Ill., $23,017.40; Lewistown Pipe Co., Chicago, $10,521.60; Concrete Conduit Co., Ltd., Colton, Cal., $31,192.26; Universal Concrete Pipe Co., Columbus, O., $12,919.72; and Concrete Products Co. of America, Pittsburgh, $10,432.50.

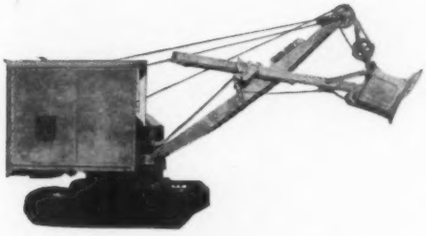
CEMENT: Standard Builders' Supply Co., Grand Rapids, Mich., $10,500; Canton Bros., Watson, Minn., $25,700; Material Service Corp., Chicago, $15,975, $16,200 and $36,325.02; Bay City Plaster & Supply Co., Bay City, Mich., $10,696; Koenig Coal & Supply Co., Detroit, Mich., $12,180; Riverside Cement Co., Los Angeles, Cal., $12,069.25; and Cook & Nichol, Inc., Memphis, Tenn., $13,050.

MEN of the INDUSTRY

W. A. BLISS

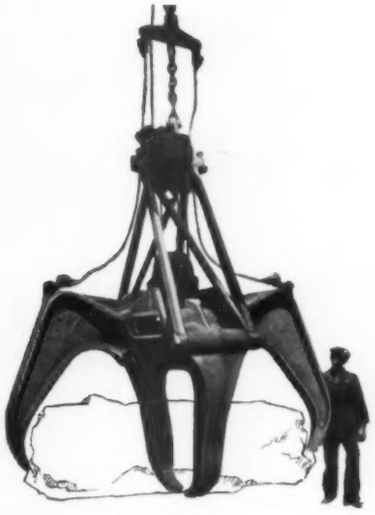
Mr. Bliss has been identified with the sand-and-gravel industry for 32 years through his connection with the Dravo Corp. and its subsidiary, the Keystone Sand & Supply Co., Pittsburgh, Pa., being vice-president of the last-named concern. He has always been active in the affairs of the National Sand & Gravel Assn., having been chairman of one of its sessions at the convention last month at Memphis. He is also a charter member of the National Ready-Mixed Concrete Assn. and like many of to-day's successful business men began his career as a school teacher.

EXCAVATING EQUIPMENT



The use of alloys in this Model 20 full-revolving 3/8-cu.yd. excavator eliminates dead weight. It is fully convertible and may be had with gasoline, Diesel or electric-motor drive. (Bay City Shovels, Inc., Bay City, Mich.)

This heavy-duty 3/8-cu.yd. truck shovel is especially adapted to quarries and pit operations.. Full-circle swing which allows loading over the front makes this unit particularly efficient when work must be carried on in close quarters. The boom is kept under complete control at all times by the use of a safety pawl and a powerful brake. The controls are finger-tip air clutches with positive smoothness which eliminate strain on the operator. (Michigan Power Shovel Co., Benton Harbor, Mich.)



Each tine operates independently in this four-tine Type R.A. grapple, the makers having compared its action to that of a giant octopus. It is built in capacities of from 3 to 60 tons. Speed in placing the unit in position for a firm pick-up is said to be a feature. (Owen Bucket Co., Cleveland, O.)

The clamshell dredge bucket shown above, developed during the year, is of the power-arm type and is of all-welded construction. It has a working capacity of 6 cu.yd. of material. (Wellman Engineering Co., Cleveland, O.)

Inspect the newest developments in equipment at the convention of the National Crushed Stone Assn., Jan. 18-20, Cincinnati, O., Netherland Plaza Hotel.

Worm gears were employed for the first time last year in the Ward Leonard electric excavator pictured above. All operations are capable of one-man control. Arc-welded alloy steels are used in its construction. (Harnischfeger Corp., Milwaukee, Wis.)

The most important feature of the shovel shown here is the new power control with which it is equipped. The small picture at the upper right shows the operator comfortably seated at the finger-tip control board. Faster operation and increased output are said to result. (Link-Belt Co., Chicago, Ill.)

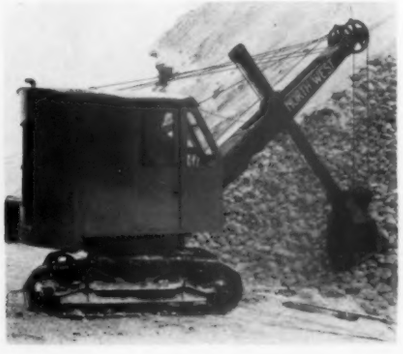
SHOVELS AND DRAG-LINES

A wide range of operating flexibility is claimed for the drag-line shown here. The machine was designed for long-range operation. Speed, ample power and tough digging are some of the features which assure high production. Supplied with either Diesel or gasoline power. (Koehring Co., Milwaukee, Wis.)

Pictured above is the large Type 416 electric shovel which went into service last year in the quarry of the Dolese & Shepard Co., Chicago, Ill. (Marion Steam Shovel Co., Marion, O.)

●

This Model 251 convertible excavator is a lightweight machine with 5/8 cu.yd. capacity as a shovel and 3/4 cu.yd. as a crane or drag-line. A simple gear shift provides two selective swing speeds to synchronize with the arc of swing and height of lift for increased output. (Koehring Co., Milwaukee, Wis.)



The crawler shovel above is supplied in two sizes—3/8 and 1/2 cu.yd. The cab is a complete enclosure and allows full vision. A standard Ford V-8 engine supplies the power. A feature of the machine is the "feather-tip" touch control, which utilizes the power to shift the clutches. The boom and dipper sticks are of welded construction. (Northwest Engineering Co., Chicago, Ill.)

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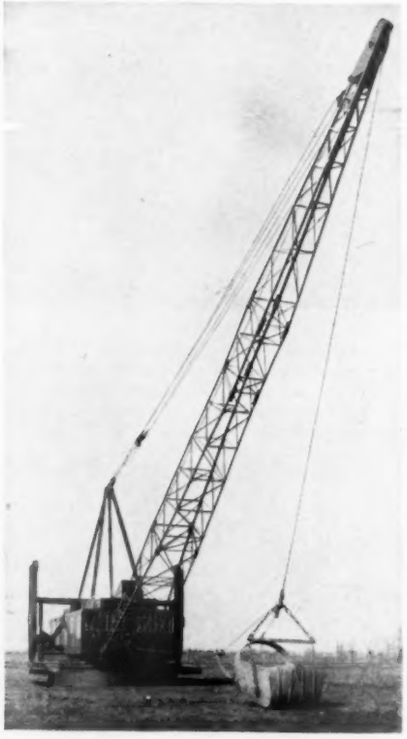
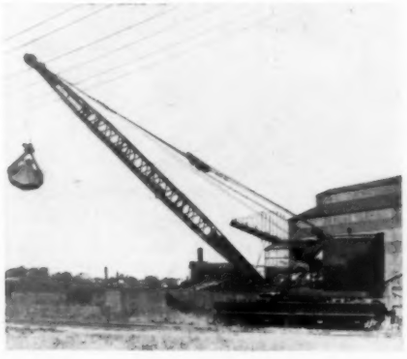


The long boom is seen in the above illustration of a walking drag-line produced during the year, which is being built in sizes from 2 1/2 to 20 cu.yd. bucket capacity. It is of the two-shoe type and attains complete mobility in operation. Power is provided by the company's own horizontal-type Diesel engine. The large base is said to give ample footing for working in even the softest ground. (Page Engineering Co., Chicago, Ill.)

EXCAVATING AND LOADING

This ¾-cu.yd. shovel was designed as an all-purpose machine and is built of high-tensile steels by electric welding. Great ease of control is obtained through the use of automotive-type foot pedals which allow the operator to make the most natural use of his strength. Standard crawlers are used and the cab is of the full-vision type. Larger brakes and clutches are employed for faster starts and stops. (Harnischfeger Corp., Milwaukee, Wis.)

This Type B shovel is quickly convertible to drag-line or crane and was one of the most popular machines produced during 1936 by its maker. When equipped as a shovel it carries a 1-cu.yd. dipper, 19-ft. boom and 16-ft. dipper handle. Oversize drums are provided to prevent "double-wrapping" of the cables and to prolong their life. All major motions of the machine are independent. (Lima Locomotive Works, Inc., Lima, O.)



The above picture shows a heavy-duty locomotive crane introduced during the year which is rated at 50 tons. Features of the machine are its two-speed hoist mechanism and the helical worm-gear drive. (Industrial Brownhoist Corp., Bay City, Mich.)

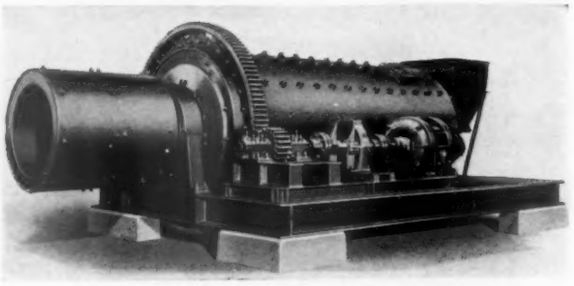
A new type loader which employs a drag-scraper is shown above. The machine is said to combine the long-range capacity of the drag-scraper with the direct-loading action of the mechanical loader. It may be had with scraper buckets of ½, ¾, 1 and 1½ cu.yd. capacity. One man operates the machine and he has only four simple levers to control. (Sauerman Bros., Inc., Chicago, Ill.)

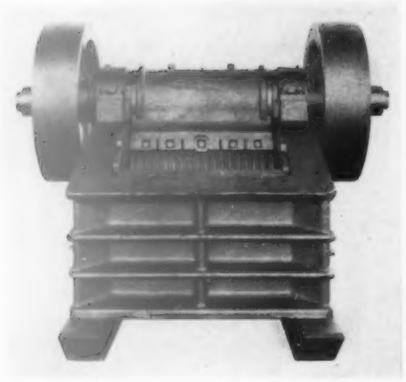
Gasoline, electric or Diesel power is available in the new 19-B ⅝-cu.yd. excavator shown above. The machine offers easy mobility, compact design, high-speed cycle and convenient convertibility features. It weighs 16 tons and has a swing speed of 4¾ r.p.m. and a hoist-line speed of 184 ft. per min. The cab is air-conditioned for thorough ventilation and all machinery is quickly accessible. (Bucyrus-Erie Co., South Milwaukee, Wis.)

Pictured at the right is the new full-revolving chain-crowd excavator known as the Invader. It can be mounted on crawlers as shown or on a commercial truck chassis. The rotating platform is a one-piece alloy steel casting, insuring constant alignment of all machinery parts. The Invader has independent swing and travel motions and the chain crowd is self-adjusting to all boom angles. (The Osgood Co., Marion, O.)

CRUSHING AND GRINDING

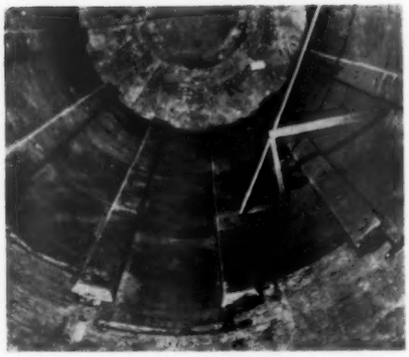
Pictured at the right is a piece of revolving equipment known as a blade mill. This is a special machine for disintegrating materials of various types. The inner periphery of the mill is provided with a series of removable teeth of a type similar to those used in a log-washer and the disintegration is effected by a combined cutting and rolling action in water within the mill. It is said to have a wide range of adaptability both for the treatment of ores and in the aggregate industries. (Allis-Chalmers Mfg. Co., Milwaukee, Wis.)





A recent roller-bearing crusher designated as Model 1536 and equipped with SKF bearings is shown above. The chief feature of the machine according to its maker is that it requires lubrication only about once every six months. The bearings are sealed to exclude dust and dirt. Both base and pitman are constructed of electric cast steel while the crushing chamber is completely lined with manganese steel. (Iowa Mfg. Co., Cedar Rapids, Ia.)

The illustration at the right depicts the new rolled-steel-plate mill lining with self-wedged lifting bars for use in ball and tube mills for cement and other grinding. The life of the ordinary liner is measured in terms of wear on the lifting bars whereas this new lining has an almost indefinite life, since the riser bars are both renewable and reversible. (Carnegie Illinois Steel Corp., Johnstown, Pa.)



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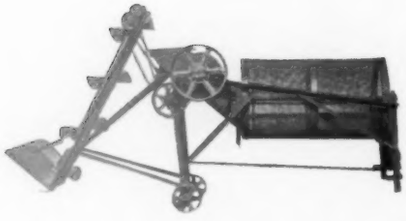
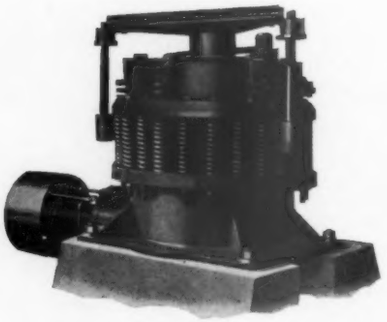
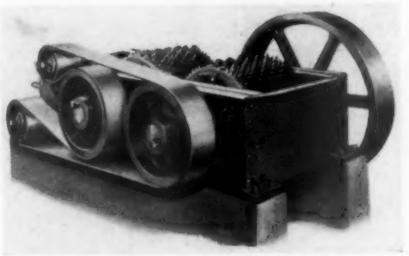


The grinder and screen shown above are said to have an important field of utility particularly in the production of molding sand. A number of these machines have already gone into service and the maker claims the users have reported exceptional results. Material is lifted to the grinding mill by a short bucket elevator as the illustration shows. (Toro Mfg. Corp., Minneapolis, Minn.)

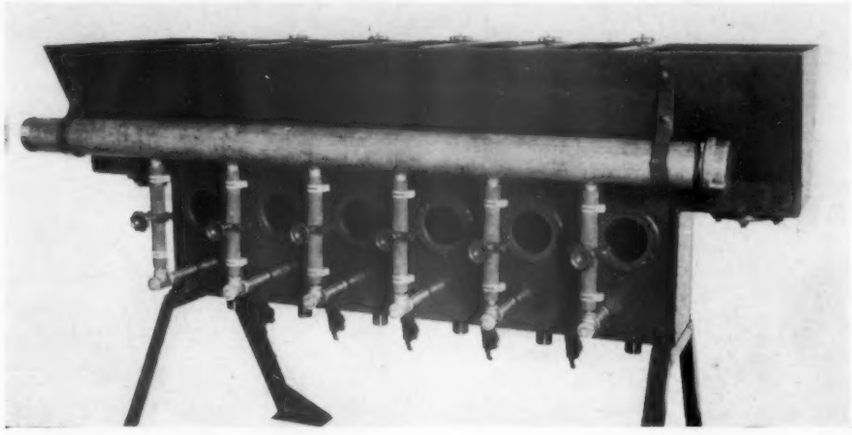


The basic features of the popular cone crusher have been retained in a smaller model introduced during 1936. It is the seventh size to be produced by this maker and is a 20-in. model. The crusher is protected from damage by tramp iron by the familiar circle of heavy coil springs. Steel castings are used for the major parts, the gear and pinion are of steel and all bearings are of bronze and are renewable. (Nordberg Mfg. Co., Milwaukee, Wis.)

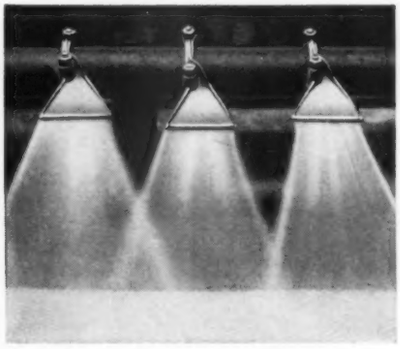
A development during the year was a new design of double roll crusher illustrated directly below. The chief feature of this machine is a self-contained endless belt drive between the rolls which allows quick adjustment of the rolls within the limits of the sizing range while the machine is running. The crusher is also provided with an all-steel frame and is strengthened by the use of heavy steel cross-ties. (Jeffrey Mfg. Co., Columbus, O.)



SCREENING...CLASSIFYING...WASHING



Designed especially for silica and glass sands, the constriction-plate classifier shown above may be had with any number of cells from one to ten. The model illustrated is a 6-cell model. Cells are lined with replaceable abrasion-resisting liners. (Deister Concentrator Co., Ft. Wayne, Ind.)



Spray nozzles consisting of smoothly-polished curved bronze deflectors which break up streams into fan-shaped sprays for washing material passing over screens were developed during the year. The deflectors are attached to the pipe with U-bolts and the water outlet is a simple drilled hole which seldom has a tendency to clog. (Link-Belt Co., Chicago.)

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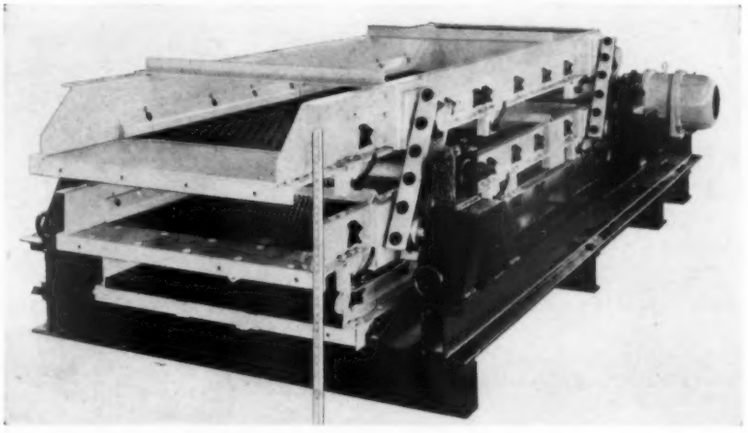
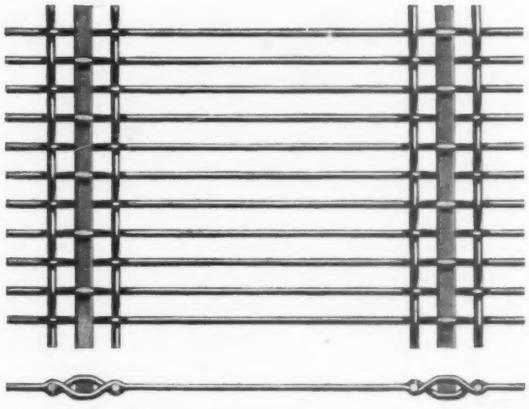


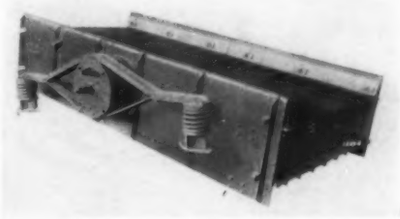
The action of this level-plane screen combines that of shaking and whipping and at medium speed, with a short stroke, will operate between 350 and 400 r.p.m. Either double or triple-deck models in a wide range of sizes are available. (Hendrick Mfg. Co., Carbondale, Pa.)



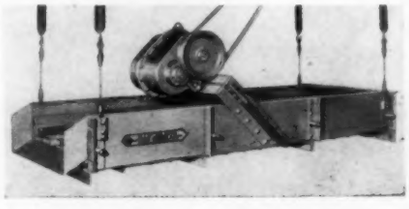
Long-mesh woven-wire screen, designed to give all the advantages of maximum open screening area inherent in the long-mesh type of screen, but eliminating the fault of stretching under tension, is shown above. Excessive tension applied to the lighter grades of woven-wire screens heretofore available for the purpose frequently resulted in stretching the crimps in the wires, allowing the openings to spread, often causing the screen to split due to breaking of the wires.

In this new Sta-Tru screen the tensioning members exert their pull exclusively on straight, uncrimped stay-bars of high tensile strength, which are woven into the screen in combination with two or more crimped spacing wires which maintain the longitudinal screening wires in their proper spacing throughout the life of the screen. (Ludlow-Saylor Wire Co., St. Louis, Mo.)

A low-head vibrating screen shown below is said to possess all the advantages of this maker's standard screens plus the ability to install in tight places. (Allis-Chalmers Mfg. Co., Milwaukee, Wis.)



An improved model Vibrex screen is illustrated above. Supplied in a wide size range, this model has its vibrator shaft inclosed in rubber. The amplitude of vibration may be quickly changed. (Robins Conveying Belt Co., New York, N. Y.)



TRANSPORTATION OF MATERIALS

Phosphate rock is hauled from the pit to the plant at the new Columbia, Tenn., operations of Monsanto Chemical Co. with the equipment pictured above. It is known as the bottom-dump Trac-Truk and was manufactured and supplied by the Euclid Road Machinery Co., Cleveland, O.

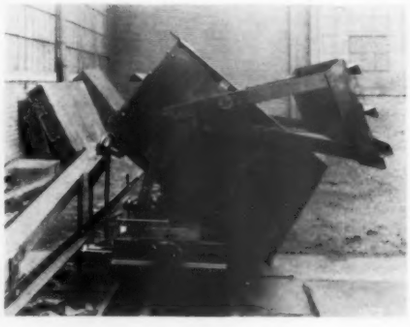
Following the modern trend toward streamlining, this open-end dump body makes a graceful yet serviceable addition to hauling equipment. The body is raised by a hydraulic hoist and is said to be especially adapted to quarry, pit and stripping operations because of its correct load distribution. (Easton Car & Construction Co., Easton, Pa.)

Large pneumatic tires of the "doughnut" type are rapidly being adopted on haulage units where soft going is encountered. The 12-cu.yd. carrying scraper for use with a tractor shown above is typical of these units. This model is cable-controlled by the tractor operator by means of a double-drum power-control unit mounted at the rear of the tractor. (R. G. LeTourneau, Inc., Peoria, Ill.)

The maker claims this side-dump trailer to be one of the most versatile pieces of equipment ever designed for quarry service. It can be loaded or unloaded as easily as a dump car but can be used anywhere without the necessity of laying track. It is supplied in either 11 or 14-cu.yd. capacity. (Athey Truss Wheel Co., Chicago, Ill.)

Designed by an operator who has gone into the manufacturing end because of widespread demand, this "dumpster," as it is called, handles loaded buckets from the quarry floor to the crusher. It is particularly suited to hand-loading operations. (Dempster Bros., Knoxville, Tenn.)

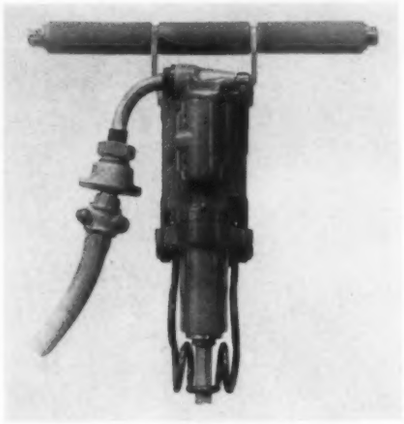
This Model 10M dump truck is one of the new lower-priced models recently introduced by the manufacturer. It is driven by a 6-cyl. gasoline engine and has four speeds forward. (Mack Trucks, Inc., New York, N. Y.)



Automatic dumping is a feature of this 80-cu.ft. Granby-type side dumping car. Note the dumping roller on the incline in the illustration. The automatic top places the load where it is desired. (Atlas Car & Manufacturing Co., Cleveland, O.)

One of the two "luggers" introduced by this concern during the year is pictured above. It is a six-wheel unit with two driving axles and the body has a capacity of 12 cu.yd. (The Hug Co., Highland, Ill.)

COMPRESSED-AIR EQUIPMENT



Due to the inability of many rock drills to give satisfactory performance when drilling soft material, the above 45-lb. auger drill was developed. By means of a simple change, however, it can be converted for use in hard rock. Its ability to operate successfully in soft work is due to its tremendous stalling torque resulting in an extra strong rotation. Stalling is consequently minimized. Superior drilling speed, ease of operation and low upkeep cost are claimed by its use. (Sullivan Machinery Co., Claremont, N. H.)

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A new tool which simplifies the breaking of large bowlders or pieces of rock was developed during the year and is pictured above. The breaker fits the standard hand drill and its use is said to eliminate the trouble and expense involved when explosives or the plug-and-feather method are resorted to. It is made of special analysis steel and may be obtained in several sizes with hexagon shanks. (Atlantic Steel Co., 1775 Broadway, New York, N. Y.)

A new stationary heavy-duty air and gas compressor of the single-stage, single-cylinder, double-acting horizontal type, built in sizes from 10 to 50 hp. and for pressures from 5 to 150 lb. Advantages claimed are long life, low power cost and fully automatic operation. Features stressed are Timken double-row main bearings, replaceable cylinder liner and crosshead guide, tinned piston and crosshead, and long-life streamlined valves. (Sullivan Machinery Co., Michigan City, Ind.)

Hot oil from air compressors is said to have little if any deteriorating effect on the 5-ply air hose shown above. The tube is made from a compound similar to that used in oil-conducting hose and, according to the maker, can be saturated with oil for long periods of time without visibly affecting its serviceability. (Republic Rubber Co., Youngstown, O.)

Lengths of 500 ft. are obtainable in the Hipress air hose of which the ply construction is shown above. The tube is made of a special rubber able to withstand continued exposure to oil and heat, while the outer cover is compounded to withstand abrasion and abuse. Three sizes—1/2, 3/4 and 1 in. are furnished. (B. F. Goodrich Co., Akron, O.)

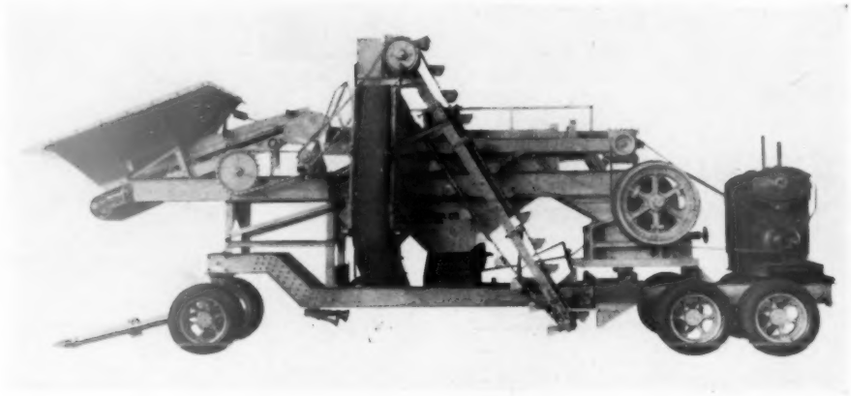
The wagon drill illustrated above is designated as the Model WDS and it was designed to meet the variety of drilling conditions encountered in quarries in many locations. It is mounted on pneumatic tires and its mast will accommodate drill steel in lengths up to 10 ft. (Gardner Denver Co., Quincy, Ill.)

A light-weight wagon mounting for fast and powerful rock drills is shown above. It will handle 20-ft. steels and will accommodate a 6-ft. steel change. Feed is by air-motor, with an infinite range of feed pressure from 1 to 1,000 lb. A self-locking worm drive allows feeding the drill up to the rock exactly as with a hand-cranked drill—a distinct advance in the method of feeding drills on wagon-drill service. The new mounting provides an easier and faster method of handling the heavier drills, resulting in increased yardage with less fatigue to the operator. (Ingersoll-Rand Co., New York, N. Y.)

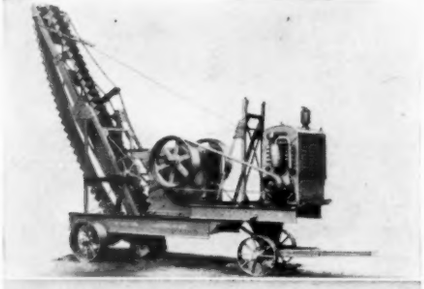
PORTABLE PLANTS AND EQUIPMENT

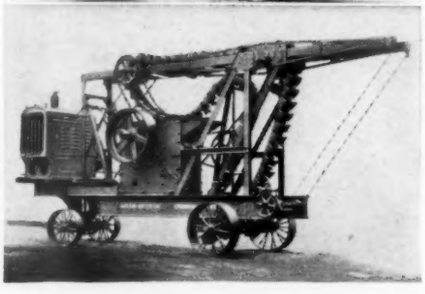
A super-tandem portable crushing-and-screening plant shown in operation. The maker claims extraordinary capacity for the machine, which is available in a number of sizes to suit requirements. Employs roller-bearing primary and secondary crushers and Symons vibrating screen. (Iowa Manufacturing Co., Cedar Rapids, Ia.)

Portable conveyors similar to the one above are supplied in 14-in. and 18-in. widths and in lengths of 20 ft. and 40 ft. Gasoline-engine or electric-motor power is optional or the units can be supplied with pulley only. Capacities range from 50 to 70 tons at a belt speed of 200 ft. per min. (Robins Conveying Belt Co., New York, N. Y.)



One of the straight-line portable plants developed during the year. This outfit is available with shovel hopper as illustrated or may be had with a feeder conveyor. (Iowa Manufacturing Co., Cedar Rapids, Ia.)



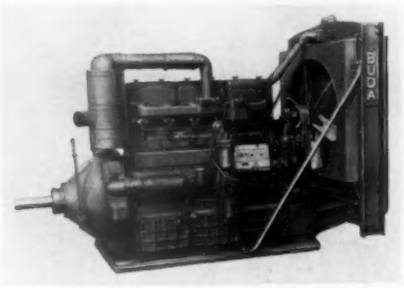


Portable crushing plants with folding elevators to facilitate transporting the equipment are illustrated above. Eight sizes are supplied with jaw openings in the crushers as follows: 9 by 16, 9 by 20, 12 by 20, 15 by 20, 4 by 40, 9 by 40, 18 by 38 and a roll crusher for crushing accurately sized stone with 30-in. rolls having a diameter of 18 in. Waukesha motors of suitable horsepower are used to power the new line and the power take-off is by a V-belt drive. (Austin-Western Road Machinery Co., Aurora, Ill.)

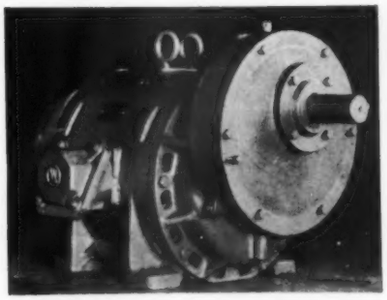
This portable crushing-and-screening plant incorporates the Rotor-Lift, a device which eliminates the use of a bucket elevator and makes a short wheelbase possible. The Rotor-Lift revolves slowly carrying the material from the crushers up and over the main plant conveyor where it is automatically discharged by gravity. A unique arrangement of the decks on the vibrating screen assures proper sizing with unusually large capacity. (Diamond Iron Wks., Minneapolis, Minn.)

POWER AND POWER TRANSMISSION

The Type S Diesel engine is of improved design and thoroughly modern in every respect. It is of the vertical, 4-cycle, single-acting, solid-injection type built for heavy duty, continuous service at medium running speeds. The engines are available in ratings of from 150 to 460 hp. and are made with 3, 4, 5, 6 and 8 cylinders. (Ingersoll-Rand Co., New York, N. Y.)



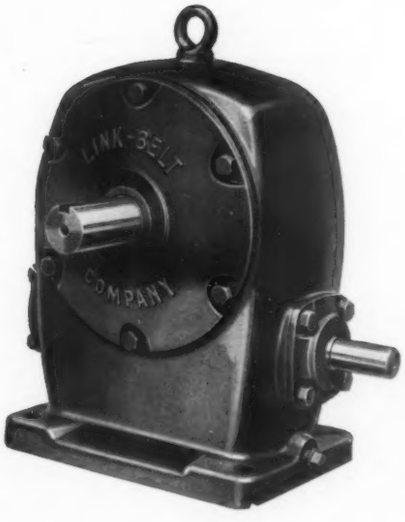
The high-speed Diesel engine illustrated above was one of the most recent additions to its maker's line. It is a 6-cyl. 4-cycle, solid-injection model with a 5¼ bore and 7-in. stroke and develops 178 hp. at 1500 r.p.m. Because of its lower specific weight, compactness, etc., it is said to be ideal for generator, stationary or portable service. (Buda Co., Harvey, Ill.)



Explosion-proof gearmotors ranging in size from 1½ to 75 hp. are particularly adapted for use in hazardous locations. The gears in this model are of the single helical type and are heat-treated to resist wear and shock. (Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.)

Ready-mixed-concrete trucks as well as other motor truck units may have their capacities greatly increased through the use of what is known as the dual ratio 4-wheel drive. It is claimed that by substituting this unit for the conventional rear-end assembly a 1½-ton truck can handle 13 gross tons when operated as a 6-wheeled unit. (Thornton Tandem Co., Detroit, Mich.)

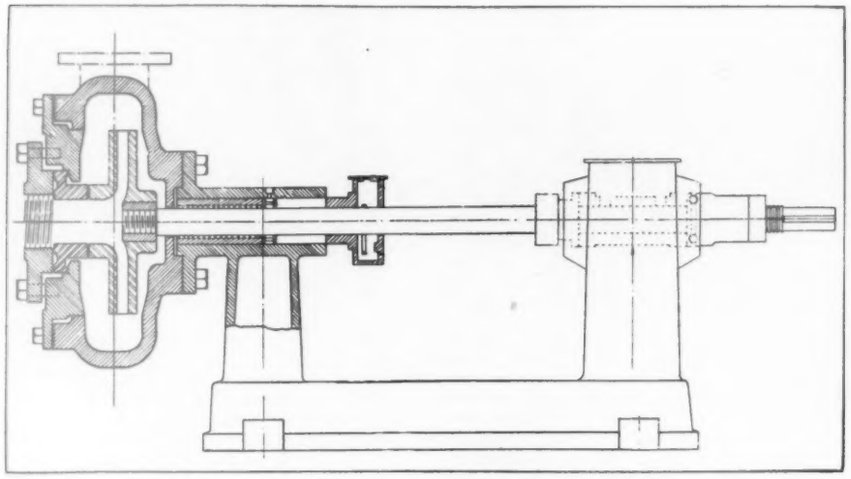
Above is illustrated one of the new motors of open sleeve-bearing design recently introduced by the maker. These units are of the squirrel-cage polyphase induction type and have riveted frames. (General Electric Co., Schenectady, N. Y.)



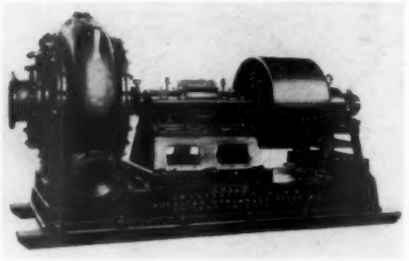
Illustrated above is one of the new cut-tooth, worm-gear speed reducers introduced during the year. They are available in a wide range of ratios and capacities. The reducers are provided with precision tapered roller bearings and automatic lubrication within a dust-proof gray-iron housing. The output shaft can be located either above or below the worm shaft. A feature of the double-reduction reducer is the unitized attachment of the primary reduction unit to the side of the final reduction housing. (Link-Belt Co., Philadelphia, Pa.)

Portable Diesel engines have a particular field of usefulness in the operation of portable crushing-and-screening plants. One of these power units is illustrated above driving such a plant in Minnesota. Production is said to have averaged about 100-cu.yd. per hr., the Diesel engine having a rated capacity of 125 hp. (Caterpillar Tractor Co., Peoria, Ill.)

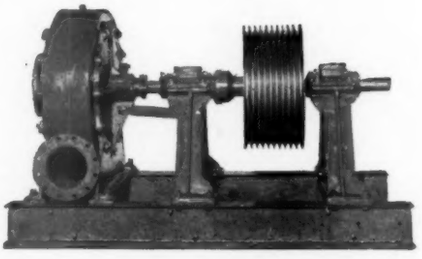
CENTRIFUGAL PUMPS



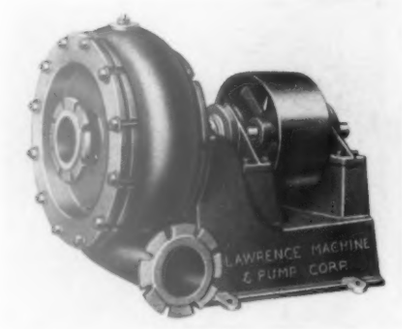
The drawing above shows a section through one of the smaller size sand pumps for use against moderate heads. Although of the unlined type, those parts subject to the most wear can easily and quickly be replaced at comparatively small cost. The impeller is of white iron, extremely hard and ground to fit. (Kimball-Krogh Pump Co., San Francisco, Cal.)



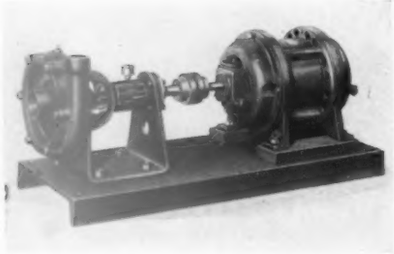
Counter-flow action is said materially to reduce internal wear in this manganese-steel-lined centrifugal pump. A wide, funnel-mouth impeller is a feature. (American Manganese Steel Co., Chicago Heights, Ill.)



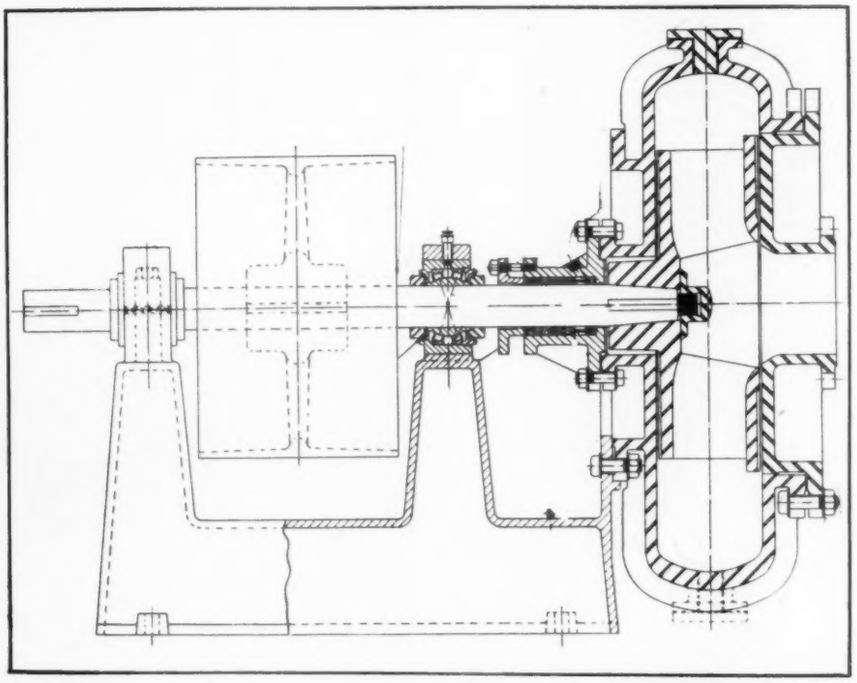
This 10-in. centrifugal pump for dredging service is equipped for multiple V-belt drive. (Kansas City Hay Press Co., Kansas City, Mo.)



This standard dredging pump is featured by its ability to handle large-sized solids without clogging, ruggedness, low maintenance and extremely low power consumption. There are only three wearing parts—the shell, the impeller and the suction disk. Each of these parts is simple in design. (Lawrence Machine & Pump Co., Lawrence, Mass.)

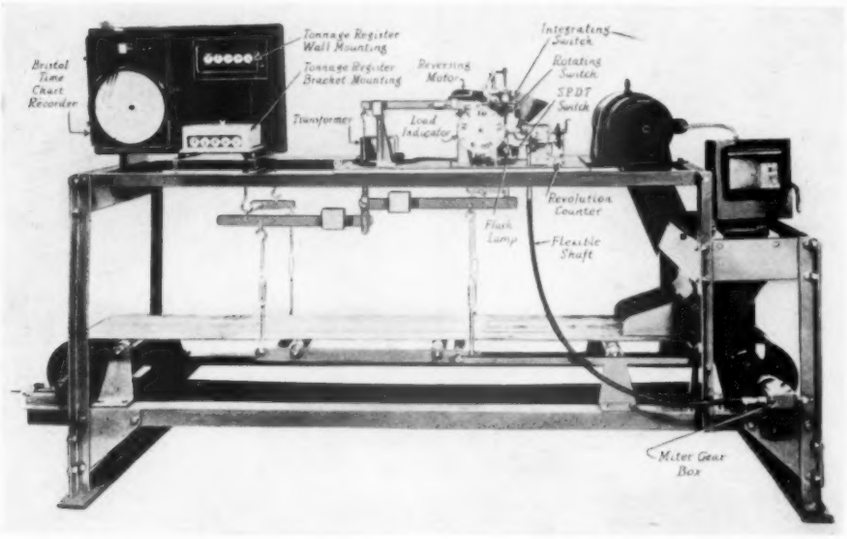


Capacities of from 10 to 130 gal. per min. with motor sizes of 1/3 to 3 hp. are claimed for the low-cost centrifugal pumping unit shown above. Dirt-proof ball-bearings are employed and the suction head may be quickly removed for inspection. (Worthington Pump & Machinery Corp., Harrison, N. J.)

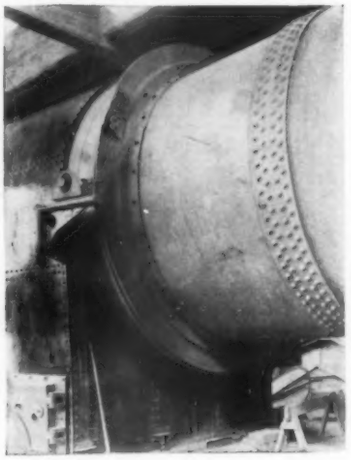


The special design of the impeller in the sand pump diagrammed above develops and maintains high efficiency without requiring a mechanical seal at the suction throat, according to its maker. There are few parts subject to wear. (Morris Machine Works, Baldwinsville, N. Y.)

MISCELLANEOUS EQUIPMENT



Conveyor scale for continuously weighing loads in motion, designed for small capacity requirements. First exhibited at 1936 American Mining Congress. The machine is a self-contained unit and is available in a wide range of sizes to cover various capacities. (Fairbanks, Morse & Co., Chicago, Ill.)

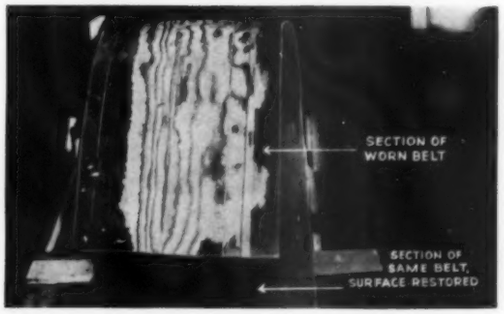


Kiln efficiency is said to be increased from 7 to 12 per cent. by the use of the seal rings illustrated above. Adaptable to kilns, driers and coolers. (Huron Industries Co., Alpena, Mich.)

Dust collector consisting of a volute-shaped main casing provided with inlet through which dust-laden air enters tangentially. The design is said to create a cyclonic action without turbulence. (American Blower Corp., Detroit, Mich.)

Recently introduced 1½-2 ton truck, which is featured by numerous advancements in design. In the low-priced range. (General Motors Corp., Detroit, Mich.)

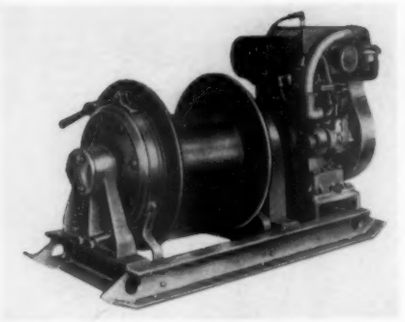
(Below) Kiln end of Pyrosteel, a heat-resisting alloy. (Chicago Steel Fdry. Co., Chicago, Ill.)



Worn conveyor belt salvaged by coating with a plastic-rubber compound (Self Vulcanizing Rubber Co., Chicago, Ill.)

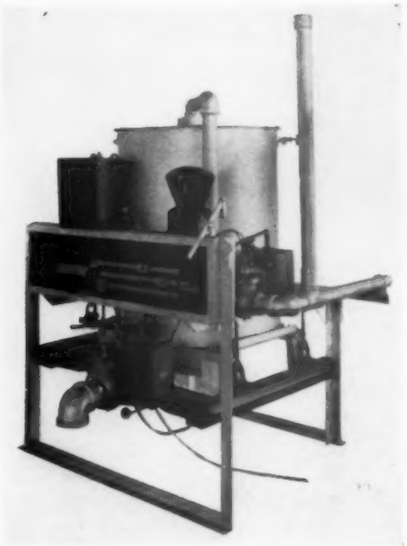
MISCELLANEOUS EQUIPMENT

Automatic cement unloader drawing cement from bin in stock-house. An improved model with remote control which offers a wide field of utility with any dry, pulverized material. (Fuller Co., Catasauqua, Pa.)



New hoisting unit in which maximum portability and simple operation are featured. The unit may be had with either a 1-cyl. or 4-cyl. gasoline engine, depending on the hoisting capacity required. (Sullivan Machinery Co., Claremont, N. H.)

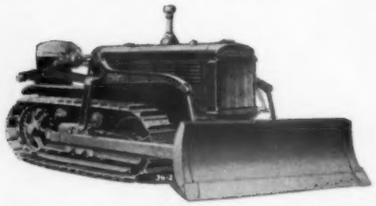
New heavy-duty hydraulic dirt mover for use with the special Allis-Chalmers Model WM tractor. Capacity of scoop, ½ cu.yd. Lift, 7 ft. (Frank G. Hough Co., Chicago, Ill.)



Automatic water-weighing device for concrete plants. Supplied in two tank sizes, 105 and 220 gal. Assures precision control of concrete specifications. (Butler Bin Co., Waukesha, Wis.)

Recently developed shunt for short-circuiting electric blasting cap wires consists of a piece of aluminum foil wrapped around the bare ends of both wires. Easy to remove and highly efficient as compared to older types. (duPont Co., Wilmington, Del.)

Newest model open-top mixer or agitator truck for ready-mixed concrete or other premixed materials. Supplied in 1- and 1½-cu.yd. capacities as mixers; slightly greater when used as agitator. Side or rear discharge. Gears are completely housed. (Concrete Transport Mixer Co., St. Louis.)

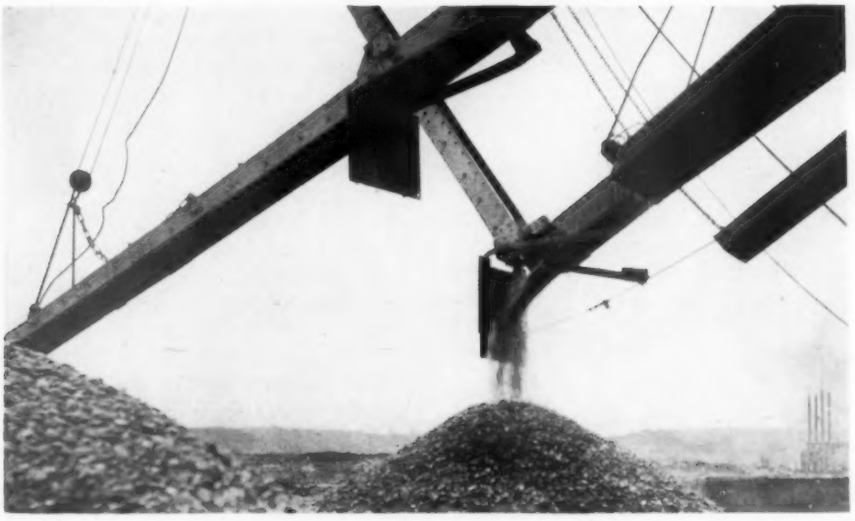


Bullgrader and bulldozer for use with tractor. Blade tilts and may be placed at an angle. Of rugged, box-welded construction. (Bucyrus-Erie Co., South Milwaukee, Wis.)

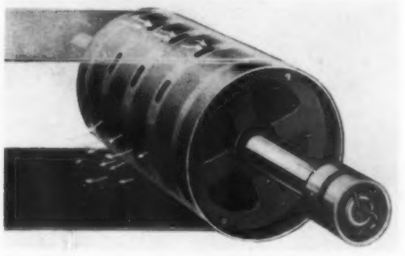
This latest model concrete-mixing truck has a speed control for adjusting the rate of mixing to the time and length of the haul. The model illustrated has 2½-cu.yd. capacity. (Jaeger Machine Co., Columbus, O.)

MISCELLANEOUS EQUIPMENT

Modernistic in design, this new pressure gun for lubricating machinery fittings has a capacity of 40 lb. Delivers 11 to 18 oz. per min. at 150 to 200 lb. air pressure. (Alemite Corp., Chicago, Ill.)



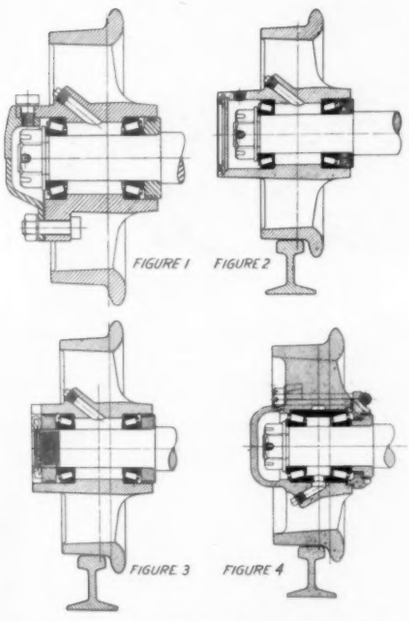
Armorite, a special rubber compound which may permanently be vulcanized to metal, forms the linings of these gravel chutes. Not only does the material resist abrasion but noise is eliminated to a high degree. Also available in sheet form attached to various gages of steel. (B. F. Goodrich Co., Akron, O.)



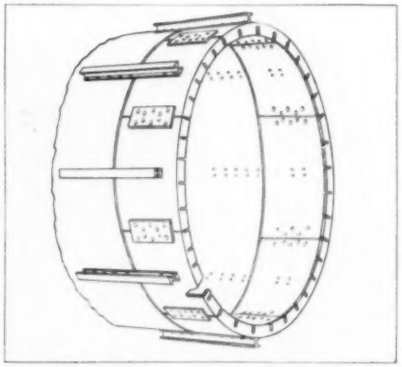
Slots in the magnetic pulley illustrated above aid in cooling the coils. Air is forced in and out by action of the belt, as indicated by the arrows. (Stearns Magnetic Mfg. Co., Milwaukee, Wis.)

Improved Colton-Lang recuperator for use in utilizing waste heat at rotary cement kilns and to arrest dust. (Traylor Engineering & Mfg. Co., Allentown, Pa.)

Typical arrangement of a radial-storage system which has recently been improved. Made in sizes to meet production capacities of 50 to 500 tons per hr. (Fred T. Kern Co., Milwaukee, Wis.)



Four types of roller-bearing mountings for mine-car wheels. Fig. 1 shows the standard two-bearing mounting with annular-groove closure, Fig. 2, the labyrinth closure, Fig. 3, conventional nut mounting, Fig. 4, the new shrunk-on dust collar modified to provide a labyrinth seal. (Timken Roller Bearing Co., Canton, O.)



Kiln-end nose ring of special alloy steel for mounting on all sizes and types of rotary kilns. Consists of eight segments supported from the kiln shell by I-beams. (American Manganese Steel Co., Chicago Heights, Ill.)

Personal Mention

A. J. Wedekind, of Dale, Ind., former member of the Indiana State Highway Commission and cashier of the Dale State Bank has been appointed trustee of the Hy-Rock Products Co. at Marengo, Ind., replacing the West Side Bank at Evansville, Ind.

Cleve Rowley and George Vittitow have filed suit in the Union County circuit court at Morganfield, Ky., against the Bedford-Nugent Co., of Evansville, Ind., asking damages in the sum of $5,000 for the alleged removal of gravel from the Ohio River in front of their farms.

E. D. Flynn has been appointed chief engineer of Oliver United Filters Inc., with headquarters at Oakland, Cal. He will direct engineering for both the Oakland and Haz'eton factories. Mr. Flynn has been continuously associated with the company since 1917. Immediately prior to his transfer to Oakland as chief engineer he was in charge of the central sales division with headquarters at Chicago.

Paul H. McMillin, superintendent of the Roche Harbor Lime & Cement Co., Roche Harbor, Wash., has been chosen director of District 14 by the National Lime Assn. He succeeds John S. McMillin of the same concern who recently died.

H. D. Bellamy, formerly with the Concrete Materials Co., Waterloo, Ia., has purchased deposits near Correctionville, Ia., and will operate shortly as the Bellamy Sand & Gravel Co.

William E. Umstattd has been elected president of The Timken Steel & Tube Co., a wholly-owned subsidiary of The Timken Roller Bearing Co., in addition to continuing in his present capacity as president of the parent company.

John C. Hopkins has been elected vice-president and sales manager of the Wellman Engineering Co., Cleveland, O. He assumed his new position on Jan. 1.

The Mixer You've Been Waiting For

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The knowledge gained through eight years in designing mixers for the ready-mixed concrete industry is reflected in this newest model. Easy charging, control and inspection are made possible by open-top construction. Revolving, helical blades with rubber inserts insure thorough mixing and control the discharge from either side or rear. A ball-bearing power take-off allows variable mixing speeds of from one to 20 r.p.m. The entire unit is of all-steel construction, the cut-steel gears being fully housed in an oil bath. Write today for new descriptive folder and the reports of satisfied operators.

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Walter E. Hart of the Kansas City, Mo., office of the Portland Cement Assn., is convalescing from the effects of a major operation. Mr. Hart was formerly manager of the structural and technical bureau at the association's general headquarters at Chicago.

J. A. Krugler

J. A. Krugler, of New York, has been appointed general sales manager of the Taylor-Wharton Iron & Steel Co., High Bridge, N. J. Mr. Krugler succeeds J. C. Taylor, Jr., who recently resigned. For the past 12 years, Mr. Krugler has served the Taylor Wharton organization as sales engineer—for six years in the mining field, and subsequently at New York. Previous to this time, his experience was in railroad and mining engineering. He was born in Pottstown, Pa., and attended Rensselaer Polytechnic Institute.

Mr. Krugler's new responsibilities put him in charge of sales of an organization which is the second-oldest company of any kind in continuous existence on the North American continent. Organized in 1742 as the Taylor Iron Co., it ranks second only to the Hudson's Bay Co. in this respect.

John T. Brown, formerly works manager of the Chain Belt Co., Milwaukee, Wis., has been elected a vice-president of the company. Mr. Brown has been connected with the Chain Belt organization since his graduation from Yale in 1925.

B. Howard MacNeal has been transferred from Memphis, Tenn., to the Link-Belt Co. office in Philadelphia.

Charles Warner recently placed his new sand-and-gravel plant in operation at Waterford, Cal.

Herbert L. Gingell, 47, Fairfield, Pa., passed away recently. Mr. Gingell was a quarry operator for the past 15 years in Adams County, having operated a plant at Fairfield and more recently a second plant at Gettysburg. George Gingell, a nephew of the deceased has been appointed temporary manager.

M. G. Roll, 87, a director of the Monarch Cement Co., since its formation in 1918, passed away recently at his home in Wichita, Kan.

WALTER S. MORRISON, 69, traffic manager of the Great Lakes Portland Cement Co., Buffalo, N. Y., passed away a short time ago. He was a native of Urbana, Ill., and had been connected with the cement industry since 1908, when he became traffic manager of the Oklahoma Portland Cement Co. at Ada, Okla.

JOHN WALSMA, 61, former manager at Grand Haven, Mich., for the Construction Materials Co. of Chicago, died recently at Grand Haven.

FRANK T. MASON, 56, president of the Pine Mountain Granite Co., Atlanta, Ga., died recently.

FRANK POHLSKI, 46, met his death December 2 when he was buried in a slide of gravel at the Lockport, Ill., plant of the Material Service Corp., Chicago, Ill.

ALFRED F. COOKE, president of the Schaffer Poidometer Co., Pittsburgh, Pa., died Nov. 27.

CHARLES A. PATTERSON, president of the Standard Sand Co. of Cleveland, O., passed away recently. He was 62 years old.

WILLIAM H. ANDREWS, supervising chemist for the Allentown Portland Cement Co., who died recently, had a long career in the cement industry. At the turn of the century he became chief chemist of the Castalia Portland Cement Co. From 1902 until 1909 he was with the old Alta Portland Cement Co., from 1909 until 1925 with the Three Forks Portland Cement Co. and since 1925 with the Allentown organization. He was 58 years old and a native of Pittsburgh, Pa.

The Productive Equipment Corp., Chicago, Ill., maker of vibrating screens, has established a research department for free service to the industry. Actual screening data will be developed in the laboratory for users and prospective users of vibrating-screen equipment.

S. K. F. Industries, Inc., Philadelphia, will exhibit a full range of ball and roller bearings and transmission appliances at the road show in New Orleans, January 11-15. Headquarters will be maintained in Hotel New Orleans, and attending will be R. C. Byler, N. Miller, J. B. Castino, and R. R. Zisette.

The Boston representative of Smith Engineering Works, which is the Anderson Engineering Co., has moved its offices to 81-83 Binney St., Cambridge, Mass. Their former location was 605 Statler Bldg., Boston, Mass.

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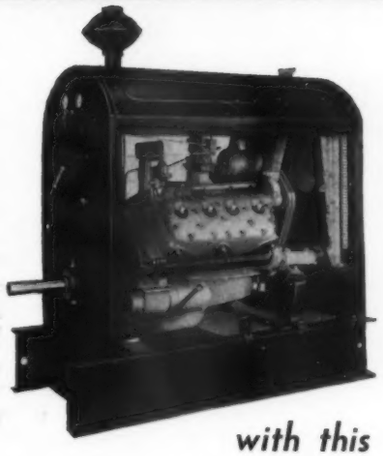

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Foreign Developments

LeChatelier and Goslich, Pioneers in Cement, Die

Two European pioneers in cement and cement research have recently died within a short time of each other, Henry Le Chatelier in France at almost 86, Dr. Karl Goslich in Germany at 84.

Le Chatelier, born in 1850, became a professor in the French National School of Mines at 27, and later at the College de France. His contributions to the scientific and technical journals continued practically up to the time of his death. Besides his work in the study and knowledge of cement, he made many contributions to metallurgy and to industrial chemistry. Among his contributions to the knowledge of cement and the hydraulic binders in general were the recognition of the tricalcium compounds as the main constituents of cement, and the "discovery" of alite, his theories on the hydrolysis and set of cement (which later research has made to accord, by synthesis, with those of Michaelis), the needle apparatus, and many others. (*Revue des Materiaux de Construction et de Travaux Publics,* No. 325, October, 1936, pp. 217-219; *Zement* 25:846-847, Dec. 3, 1936; Dr. Hans Kühl in *Tonindustrie-Zeitung* 60: 1133, Nov. 16, 1936.)

Dr. Karl Goslich at the age of 24, in 1876, became the assistant of Delbrück in the laboratory of the Stettiner Portlandzementfabrik in Germany, and in 1893 succeeded Delbrück in charge. His active connection with the German cement industry saw the industry develop through the crude early stages. His own contributions to cement technology were numerous. He had been retired from active work since 1917. (*Zement* 25:811, Nov. 19, 1936; *Tonindustrie-Zeitung* 60:1145, Nov. 19, 1936.)

New Lime-Silica Ratio for Avoidance of Rings

A study of the causes of the formation of deposits or rings on the lining of cement-kiln shells shows that in general the cause is chemical, and particularly a raw mixture that fuses too easily. For kiln control to avoid the formation of such rings the author proposes a "lime-remainer-silica ratio," *i.e.,* the ratio of total lime (CaO, mol) minus CaO in $CaO.Al_2O_3$ (mol) to the SiO_2 (mol). In mixtures which formed rings and those which did not, in the cases studied, it was found that rings did not form if this ratio did not exceed 3.19, but formed if it passed above that point.

The various methods of removing rings that have been proposed or are in use are criticized (briefly), as to their success, their economy, and other advantages or disadvantages such as damage to the refractory lining. The author has had greatest success with the customary and usual method of removing the rings with "spears," improving the method by leading water through the handle to the point and spraying it into the kiln.—T. Yoshii in *Zement* 25:727-732, Oct. 15, 1936.

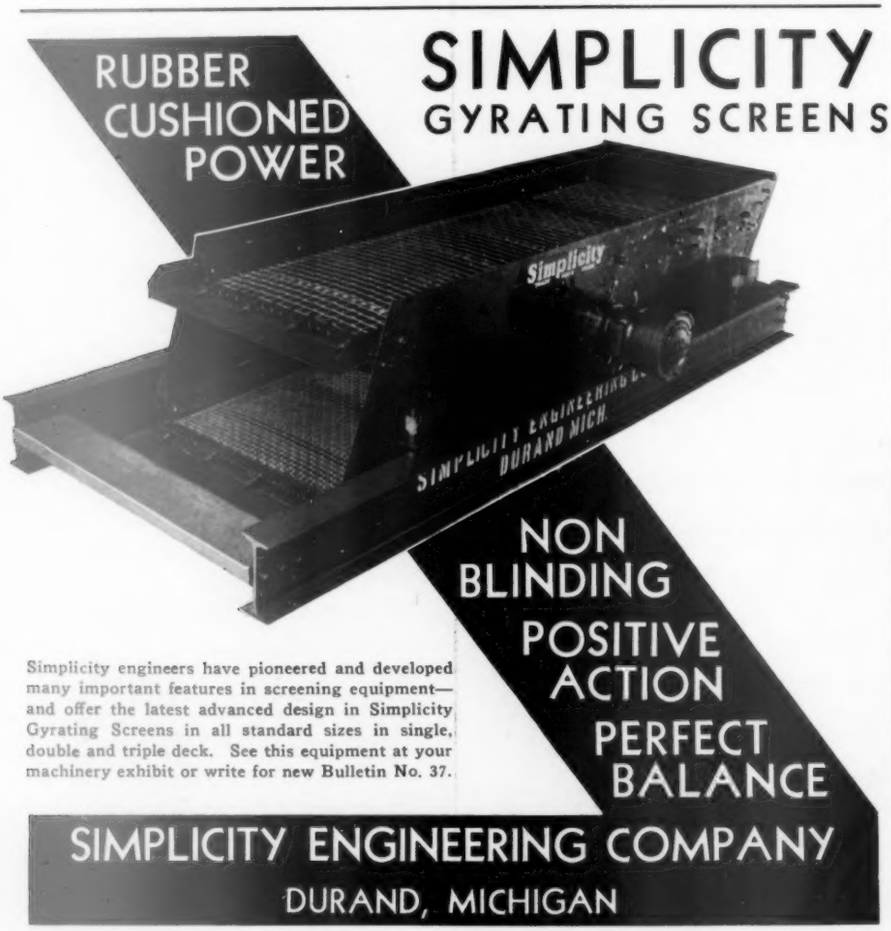
Weight per Liter as Clinker-Quality Test

A series of tests reported in this article show the weight per liter to be a good indicator of the quality of a cement clinker and the thoroughness of the burning. According to a determination of the specific gravity of the clinker particles it was shown that the pores in the clinker decrease linearly with increasing weight per liter, so that the latter corresponds to the porosity. This test is especially to be recommended for application in kiln control. In a wet-process plant it was found that when the weight per liter ran about 1.3, the clinker was underburned, at 1.3 to 1.5 it was well burned, and at points over 1.5 it was overburned. The indication also gives some information on variations in the chemical composition of the clinker.—Wilhelm Anselm in *Zement* 25:633-643, Sept. 17, 1936.

Relation of Tensile and Compressive Strengths

R. Feret has just concluded the publication, in *Revue des Materiaux de Construction et de Travaux Publics,* of a series of articles on the relation between the tensile and the compressive strengths of mortars and concretes, the general conclusion of which is that it is the compressive strength which should be considered as the true criterion of the hardness of a concrete. Long series of tests demonstrate a uniformity in the results of compressive tests as against results in tensile tests that vary widely according to attendant circumstances.

It is suggested that for particular uses where there is need to be informed concerning the resistance of concrete to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GYRATING SCREENS
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NON BLINDING
POSITIVE ACTION
PERFECT BALANCE
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bending, it should be borne in mind that this is considerably influenced by environmental factors operating on the surface of the concrete pieces, as well as the relation of this surface to the total volume, and that instead of depending upon tensile strengths shown by tests on small laboratory pieces, bending tests should be made on pieces of dimensions as close as possible to those to be actually employed, and stored under the same conditions.

The articles form a series of separate chapters on: (1) the general formula, and the nature, origin and quality of the cement *Revue des Materiaux de Construction et de Travaux Publics,* No. 318, March, 1936, p. 49 ff.; (2) composition of the mixes and prediction of strengths, and content of cement, No. 319, April, 1936, pp. 73 ff.; (3) granulometric composition of the aggregate, and dimensions of the largest elements, No. 320, May, 1936, pp. 97 ff.; shape and nature of the aggregate, No. 321, June, 1936, pp. 121 ff.; (4) pulverulent admixtures, No. 322, July, 1936, pp. 145 ff.; (5) gaging water and consistency, No. 323, Aug. 1936, pp. 175 ff.; (6) length of hardening, No. 324, Sept., 1936, pp. 193 ff.; (7) conditions of exposure, No. 325, Oct., 1936, pp. 219 ff.; (8) general review, No. 326, Nov., 1936, pp. 241 ff.

"Concrelith" Developed to Renew Stone Roads

"Concrelith" is the name of a type of road construction developed in Germany about five years ago, which has found application especially in parts of Germany where there are numerous stone-paved highways in need of rebuilding. The method is a combination of concrete paving and stone paving; a foundation of concrete is laid, the paving stones are set into this concrete, the spaces between the stones are filled with concrete and tamped, and a final application of concrete completes the filling of the joints and the spaces between and around the blocks and lays an even surface of concrete over all. In new road construction it has the advantage over ordinary paving with stone blocks that pieces of considerable irregularity can be used, thereby effecting savings in the preparation of the stone. For remaking stone-paved highways it offers a method of employing to best advantage the available worn stones.—D. Streit in *Steinindustrie und Steinstrassenbau* 31: 396-398, October, 1936.

Modified Anstett Test for Sea-Water Exposure

A series of tests on cements exposed to the salts of sea water indicate that it is indispensable that cements for concretes to be exposed to the action of sea water be tested by the Anstett test, but modified by replacing the gypsum by a composition of 11 parts of $MgSO_4.7H_2O$, 1.5 parts of $CaSO_4.2H_2O$ and 0.2 parts of $KHCO_3$. The cements withstanding this test will certainly resist the decomposing action due to Candlot's salt, and that without taking into account the favorable action of the carbonic anhydride.

For works exposed to contact with sulphated waters, however, the Anstett test is only helpful when the injurious salt is calcium sulphate, as the other sulphates behave differently.—Charles Miroir in *Revue des Materiaux de Construction et de Travaux Publics,* No. 326, November, 1936, pp. 246-253.

For aggregates producers who may be considering the manufacture of a concrete by-product to utilize some of their production at a higher profit yield, a valuable text-book on concrete pipe, its manufacture and use is available by writing the Universal Concrete Pipe Co., Columbus, O. The concern manufactures forms and other equipment for the production of concrete sewer and culvert pipe which will meet the rigid specifications for these products. The book has 92 pages and is profusely illustrated.

The S. O. Otrich Co., 119 New Montgomery St., San Francisco, Cal., has been appointed sales representative by the Stearns Magnetic Manufacturing Co., Milwaukee, Wis.

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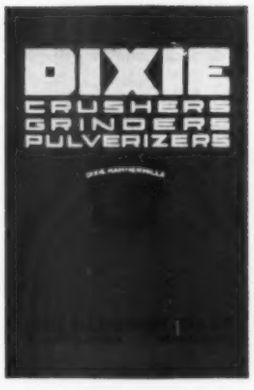

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Traffic News Digest

Recent I. C. C. Decisions

Cement.—Finding the rate charged on shipments of cement from Linwood, Ia., to Wind Lake Road, Wis., moving between April 21, 1934, and July 5, 1935, not unreasonable, the Commission has dismissed the complaint in I. C. C. Docket No. 27,297, Dewey Portland Cement Co. *v.* C. M. St. P. & P. *et al.*

In response to fourth-section application No. 16,342, the Commission has authorized carriers to establish and maintain rates on cement, c.l. min. wt. 50,000 lb., (except when for carrier's convenience a car of lesser capacity is furnished the minimum will be the marked capacity but not less than 40,000 lb.) from Birmingham, North Birmingham, Phoenixville and Boyles, Ala., to destinations in the Carolinas, without observing the long-and-short-haul clause of section four. This relief is subject to rates over the longer distances being made by using the lowest rate that can be constructed over any line or route on the basis prescribed in Southern Cement Rates, 132 I. C. C. 427, and supplemental reports. I. C. C. F. S. O. No. 12,591.

Sand.—Finding the rate on sand from Hawarden, Ia., to Brandon, S. D., in effect between Aug. 23, and Sept. 1, 1934, unreasonable to the extent it exceeded 70c., the Commission has authorized defendants to waive the collection of outstanding undercharges, in I. C. C. Docket No. 27,341, C. A. Wagner Construction Co. *v.* C. M. St. P. & P. *et al.*

Motor-Rail-Motor Rates.—A recent decision affecting the nonmetallic-minerals industry only in a limited way at present is abstracted here not so much on account of the direct interest to a large number of readers, but on account of its being the first case of the kind to come before the Commission. It may within a short time lead to some very definite changes in transportation and marketing in this industry. At the present time a very large tonnage of lime, gypsum products, cement and road building materials are moving by motor truck. Opening the way to joint motor-rail-motor rates will probably not affect the movement of the heavier commodities such as crushed stone, sand and gravel, but may easily change the transportation of lime, gypsum products and cement.

By joint motor-rail-motor rates is meant the publication of a through rate from point of origin to destination by a motor carrier, but that part of the haul is made by rail. The next logical step would be the development of rail-motor rates which would enable shippers to load their products into trailers on flat cars, which, on arrival at destination, would be hauled direct to the dealer's warehouse or to a job by a truck tractor.

In the present case the Keeshin Co., a motor carrier, published joint through rates with the Chicago Great Western and the Clinton, Davenport & Muscatine, which were substantially the same as the all-truck rates in the territory east of a line drawn through Kansas City, Omaha, Des Moines, Minneapolis, St. Paul and on and north of a line through Kansas City, St. Louis, Louisville, Cincinnati, Columbus, Akron, Pittsburgh, Philadelphia and New York, but including Washington, Baltimore and points on Long Island. The proposed schedules were suspended and were opposed at the hearing by western trunk line railroads. The principal findings of the Commission are given in the following extracts from the report:

"The proposed rates would apply on class and commodity traffic generally, when loaded in trucks, trailers, or semi-trailers owned by the motor carrier, which originates and delivers the traffic. The vehicles used are generally semi-tailers, each of which is attached to a motor tractor when it is drawn over the highway. The railroad would act only as an intermediate carrier, transporting the trailers on flat cars from and to the interchange points with the motor carrier.

"If the proposed tariff becomes effective respondents would undertake to perform joint motor-rail-motor service, and upon request of a shipper they would be obligated to furnish such service. Under the proposed joint arrangement the motor carrier originating the shipments would issue a through bill of lading for transportation at a specified rate per 100 lb. The status of the rail carrier in that arrangement would be that of a connecting common carrier participating under joint rates in the through movement.

"While it is our duty to determine whether or not the rates and charges for the proposed service would be unlawful, we may not withhold our approval of the arrangement because the pattern for the proposed rates is the existing adjustment maintained by the respondent motor carriers instead of the all-rail adjustment. Nor may we condemn the plan of joint operation merely because it differs in some essential respects from existing methods of transportation or because experience may demonstrate that certain phases of that operation are not profitable. However, nothing herein shall be construed as approving the operation of respondent motor carriers over the routes herein involved.

"We find that the proposed rates have not been shown to be unlawful in violation of any provision of the Interstate Commerce Act. Our order of suspension will be vacated. By reason of the limited experience under the proposed or any similar arrangement at the time of the hearing, and by reason of the controlling importance which respondents have attached to the all-highway rates in determining the maximum level of the proposed rates, we find it necessary to continue on our own motion our investigation of the joint rates, regulations and practices of these respondents." I. C. C. I. & S. Dockets, No. 4,210 and No. 4,219.

Examiners' Reports

Crushed Stone. — Examiner Harold M. Brown recommends that the Commission find the rate on crushed lime rock from Seattle, Wash., to St. Helens, Ore., unreasonable to the extent it exceeded 9½c., c.l. min. wt. 60,000 lb., and award reparation of $377.83, in I. C. C. Docket No. 27,452, St. Helens Pulp & Paper Co. *v.* S. P. & W. *et al.*

Sand.—In 210 I. C. C. 629 the Commission found a violation of sections 3 and 13 existed in connection with the rates on sand from Birmingham and South Pemberton, N. J., to the Philadelphia area, but did not award reparation, as complainant had not shown sufficient proof of damage to support an award of reparation. On further hearing, Examiner Burton Fuller proposes that the Commission affirm the findings in the prior report. I. C. C. Docket No. 26,596, Norcross Bros. *v.* Pennsylvania.

Strike Demurrage.—In a proposed report

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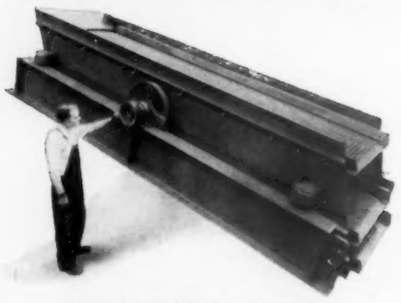

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dealing with a complaint that the assessment of demurrage charges during the time transportation was held up by the Pacific Coast longshoremen's strike, Examiner W. A. Disque recommends that the complaint be dismissed. Complainants contended that the situation was unusual, in that the strike, with its attendant circumstances, constituted a form of superior force, or *vis major*, to use the law term; that it was uncontrollable, irresistible and overwhelming, affecting both railroads and shippers alike; that shippers should not have been charged with demurrage that resulted from any cause not attributable to, or avoidable by them; that if they held equipment they did so against their will and solely because of the strike conditions, and that accordingly, they could not be said to have done anything to warrant exaction of the charges. The examiner said, "The situation clearly did not amount to vis major, but whether it did or not is immaterial. Even Acts of God do not furnish grounds for relief. (Mt. Hood Railroad Co. v. Director General, 60 I. C. C. 116.) The outstanding fact here is that complainants called for or used the cars for shipment and through no fault of the carriers failed to release them within the free time. It is axiomatic as a matter of law, justice, reason and business that when a man engages equipment he should assume all risks of delay thereto, except those incident to the carrier's indefensible acts or failures. No reason appears for expecting the carrier to indemnify or insure him against such risks." I. C. C. Docket No. 27,217, Balfour, Guthrie & Co., Ltd., *et al. v.* C. M. St. P. & P. *et al.*

New Complaints Filed

Sand.—Alleging violation of section 1, reparation is sought on a movement of industrial sand from Grenloch and Manumuskin, N. J., to Macungie, Pa., in a complaint filed by Wm. H. Neeley, attorney, 902 Mechanics Trust Bldg., Harrisburg, Pa., in I. C. C. Docket No. 27,592, Sub. No. 3, East Penn Foundry Co., Macungie, Pa., *v.* Pennsylvania-Reading Seashore Lines *et al.*

New rates on sand in open-top cars from Dundee, Geauga Lake, Phalanx and Warwick, O., to destinations in Pennsylvania are sought on a charge of violation of sections 1 and 3. The competitors preferred in the section 3 allegation are located at Ellwood Jct., Koppel, West Ellwood Jct., Dunbar, Falls Creek, Foxburg and Daguscahonda, Pa. The complaint was filed by Edwin Booker, 1228 Hamilton St., N. W., Washington, D. C., in I. C. C. Docket No. 27,602, Industrial Silica Corp., Youngstown, O., *v.* B. &. O. *et al.*

The rates on sand from Millville and Manumuskin, N. J., to Hamburg, Pa., have been attacked in Sub. No. 4 to I. C. C. Docket No. 27,592, Berks Foundry & Mfg. Co., Hamburg, Pa., *v.* Pennsylvania-Reading Seashore Lines *et al.*, and from Cedar Lake, N. J., to Williamsport, Pa., in Sub. No. 5 to the same docket, Lycoming Mfg. Co., Williamsport, Pa., *v.* same defendant. In both cases reparation is prayed for on an alleged violation of section 1, and both complaints were filed by Wm. H. Neeley of Harrisburg, Pa.

Reparation is sought on an alleged violation of section 1 on moulding sand from Elnora, Allegany, N. Y., and Dorchester, N. J., to Huntingdon, Pa., in a complaint filed by L. V. Brandt and Edgar O. Anderson, 328 South Jefferson St., Chicago, Ill., in I. C. C. Docket No. 27,605, Pierce Butler Radiator Corp., Syracuse, N. Y., *v.* D. & H. *et al.*

Traffic News

Emergency Charges.—As shippers rang out the old year and celebrated the advent of 1937

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Easy to Attach
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PYRASTEEL kiln ends, cast in four segments—completely assembled for checking and disassembled for ease in handling, ready for attachment as they come.

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they also celebrated the end, at least temporarily, of the emergency freight charges. A number of industrial traffic men confess that the order of the Commission denying an extension of the charges beyond Dec. 31, 1936, came as a distinct surprise. The hearing on the reopened case being set for January 6, it was the expectation of many traffic men that the Commission would extend the time for the termination of the charges at least until they had reached a decision on the reopened case. However, the order denying the extension made it clear that such charges would only be allowed after the shippers had had an opportunity to be heard on the subject. The only member of the non-metallic minerals industry that appeared at the hearing on the carriers' petition for an extension of the charges was C. R. Hillyer for the Gypsum Assn., who contended that the charges should not be continued. Harry C. Ames, representing the Manufacturing Chemists Assn., contended that the Commission was without power to grant an extension without a further hearing as to the reasonableness of the proposed rates.

Observe 40th Anniversary of Diesel Power in U. S. A.

Had the late Dr. Rudolf Diesel been present in the Grand Ballroom of the Palmer House, Chicago, Monday noon, Dec. 7, he would have realized that those years of toil, of tireless research and experiment, had not been spent in vain.

A huge, lighted picture of the noted inventor of the Diesel engine hung over the long speakers' table, where were ranged the leaders of the middlewest industrial, financial, political and educational world. And seated in this spacious banquet hall were 350 guests, there to honor the memory of Diesel on the 40th anniversary of the introduction of Diesel power to the United States.

In front of B. C. Heacock, president of Caterpillar Tractor Co., and host for the luncheon, was a mammoth cake, glittering with 40 candles. Beyond, in the foyer, were a Diesel tractor and a Diesel-electric generating set, the last word in modern Diesel design.

Principal speaker was John B. Kennedy, noted radio news commentator and former editor of *Collier's*. From his experiences on a recent 10,000-mile air trip during which he visited all of the leading Diesel manufacturing plants in the United States, Mr. Kennedy drew the material for his address, "The Cavalcade of Diesel."

Mr. Kennedy, painting a brilliant word-picture, told the Diesel story from the layman's viewpoint, and his listeners agreed that he told it simply, with understanding, and well.

"Could Rudolf Diesel pay a return visit to the United States, he would find that this country which he called great, had indeed realized his vision, and that it was pressing on even beyond the frontiers of his foreseeing—to outstrip the rest of the world in the manufacture and varied use of Diesel power," Mr. Kennedy said.

The speaker pictured Diesel conducting his early experiments. The inventor obtained his first Diesel patent in 1892, and 40 years ago, granted manufacturing rights to Adolphus Busch of St. Louis. The first engine made in the United States was a 2-cyl. 60-hp. unit weighing 400 lb. per hp.

Mr. Kennedy described the Diesel engine principle and the application of this prime mover in the great stream-lined trains, tractors, ships, automobiles and industrial plants of the present day. He told of his 90-mile-an-hour ride with C. L. Cummins, head of the Cummins Engine Co., of Columbus, Ind., in a Diesel-powered automobile. He described the Fairbanks-Morse plant at Beloit, Wis., where submarine and industrial Diesels are built; the Electro-Motive Corp. plant, at LaGrange, Ill., stream-lined Diesel trains, and the giant plant of Caterpillar Tractor Co., at Peoria, Ill., world's largest producer of Diesel engines.

Mr. Kennedy's address was broadcast by Station WGN over the Mutual Broadcasting Co. network.

The concluding address was given by Pres. Heacock of "Caterpillar." He gave as an example of swift-growing Diesel popularity the production figures of his company:

"In five short years we have manufactured more than a million and a quarter Diesel horsepower," Mr. Heacock said. "This year's total will exceed the combined total of the four preceding years. Our 21,000th Diesel engine was on display at the recent National Power Show in New York.

"Today seventy-six manufacturers of shovels, compressors, crushers, industrial locomotives and electric generating sets use our Diesel engines to power standard models of their products. Representatives from a number of these concerns are at this luncheon today and I wish to extend my greetings to them."

The Manitowoc Engineering Co., Manitowoc, Wisc., maker of the Vanderwerp recuperator for installation on rotary-cement kilns, reports that it has eight units under construction in its shops for three Portland-cement plants. Five of the machines are for installation on 10-ft. by 150-ft. kilns while three units will be used on 11-ft. by 175 ft. kilns.

Announcement has been made of the formation at Johnson City, Tenn., of the Southern Dynite Co., maker of high-grade explosives. The company's plant is located at Unicoi, Tenn.

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Occupational Diseases and the Law

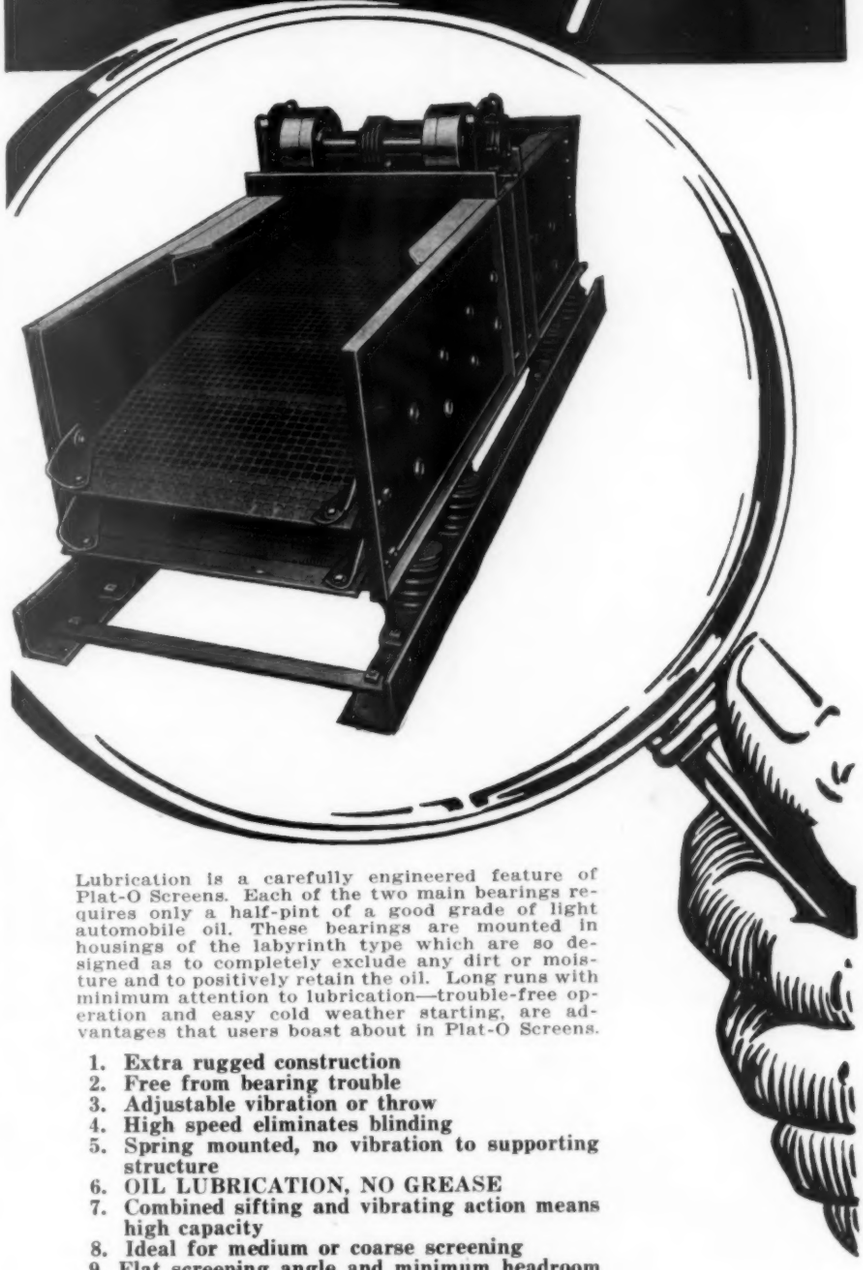
Statute of Limitations

In *Plazak v. Allegheny Steel Co.*, decided November 23, 1936, the Pennsylvania Superior Court, Western District, holds that the limitation period on "suits brought to recover damages for injury wrongfully done to the person," fixed by an Act of 1895, P.L. 236, 12 PS Sec. 34 at two years, begins to run when the breach of duty to provide a reasonably safe working place occurs; and that in the case of a continuous relation, as in that of master and servant, and of a likewise continuous default until the cumulative effect produces disability in the form of occupational disease, the master's (employer's) failure to perform his duty is regarded as a single wrong continuing so long as employment continues; the limitation upon an action to redress such wrong is accordingly two years from the time when the employment terminates. In the instant case the plaintiff alleged that he suffered with an occupational disease (silicosis) resulting from the defendant company's failure to supply a reasonably safe place in which to work as measured by the statutory requirement (Act of May 2, 1905, P.L. 352, 12 PS Secs. 5 and 6). The employment terminated April 5, 1930, when the employee became ill; the disease was diagnosed as silicosis some time after April 11, 1930; the suit was brought on March 28, 1932. The court holds that the ultimate fact to be determined is whether between March 28, 1930 (fixed by the statute of limitations) and April 5, 1930 (the date on which employment terminated) the plaintiff was suffering with any disease caused by the defendant's requiring or permitting him to work under unsafe conditions; it now appears that as a result he was then suffering with incipient silicosis; even though it began prior to March 28 and matured afterward, he is entitled to recover all the resulting damages of which he can offer proof down to the time of trial, as in other cases.

Partnership Formed by Employees

York v. Industrial Commission of Wisconsin, Wisconsin Supreme Court, decided November 10, 1936. The plaintiff and three other workmen of the Schlimgen Memorials, Inc., were laid off at the end of 1932 because silicosis had been made a compensable injury and the premiums for indemnity insurance on granite cutters had become so high that the company could

Plat-O Screens stand close inspection



Lubrication is a carefully engineered feature of Plat-O Screens. Each of the two main bearings requires only a half-pint of a good grade of light automobile oil. These bearings are mounted in housings of the labyrinth type which are so designed as to completely exclude any dirt or moisture and to positively retain the oil. Long runs with minimum attention to lubrication—trouble-free operation and easy cold weather starting, are advantages that users boast about in Plat-O Screens.

1. **Extra rugged construction**
2. **Free from bearing trouble**
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4. **High speed eliminates blinding**
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6. **OIL LUBRICATION, NO GREASE**
7. **Combined sifting and vibrating action means high capacity**
8. **Ideal for medium or coarse screening**
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10. **Long screen cloth life, no whipping**
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not afford to carry it. In April, 1933, contracts were signed by the company and the former employees, the latter agreeing to form a partnership and to carry on the "business of manufacturing monumental and building work" in the shop where such business had been carried on by the company, under a lease arrangement with the company. The company was to be the sole distributing and sales agent of the products manufactured by the partnership, and no articles were to be manufactured but those ordered by the company (other provisions of the contracts are discussed in detail in the court's written opinion). The shop business covered by the agreements continued until November 24, 1934, when York quit. The Industrial Commission denied York compensation from the company under the Workmen's Compensation Act, on the ground that the relation of employer and employee did not exist; a lower court reversed the commission's order, and the present action is an appeal to the state supreme court, which reverses the court below and affirms in effect the commission's order denying compensation. Notwithstanding the fact that "some of the provisions of the lease agreements may be considered as subterfuge," and although "it is quite plain that the company was not a sales agent for the partnership, and that the partnership did not in fact buy the stone that went into the finished product from the company," and although "it is also plain that the purpose behind the arrangement was to evade liability for compensation under the Workmen's Compensation Act," the court held that the fact that the contracts were entered into for this purpose does not bring the company and the individual partners within the act, and that "the contracts being valid for all other purposes, they were also valid in creating a partnership and a lessor-lessee relationship, and a relationship of employer and independent contractor between the company and the partnership instead of that of master and servant between the company and the individual partners."

Sufficiency of Evidence

Bieser, Administratrix, v. Goran, Missouri Supreme Court, decided November 12, 1936. In this action to recover damages for injury to the plaintiff's health while in the employ of the defendant, the court holds that the plaintiff, to recover, must make a complete case pointing to the defendant's negligence as the cause of the injury. The evidence in the case is held amply to sustain the charge that the defendant failed to perform some of, and possibly all, the statutory obligations (Missouri Revised Statutes, Secs. 13262, 13234,

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23254, 23255 and 13264), and that employment by the defendant from 1921 to 1925 was of sufficient duration to have caused the injury, but that there was no evidence upon which to base a conclusion that the disease of silicosis could be contracted and then remain unnoticed and dormant from 1925 to 1929, or that a brief employment in 1929 caused the plaintiff to contract silicosis. A lower court judgment awarding damages is reversed.

Trade Literature

Types SH and D.H. Speed Reducers. 8 p. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Type AE-1 Air Circuit Breakers. 4 p. General Electric Co., Schenectady, N. Y.

A New Standard Iron Body Wedge Gate Valve. (Folder) Kennedy Valve Mfg. Co., Elmira, N. Y.

Peerless Double-Sealed Pump Bowls. 8 p. Peerless Pump Division, Food Machinery Corp., Massillon, O.

Cooper-Bessemer Type GN Diesel Engines. 8 p. Cooper-Bessemer Corp., Mt. Vernon, O.

Materials Handling Machinery. 112 p. Gifford-Wood Co., Hudson, N. Y.

FWD Controlled Power. 16 p. The Four Wheel Drive Auto Co., Clintonville, Wis.

Dry and Grind Simultaneously with the Thermomill. (Folder.) The Hardinge Co., York, Pa.

All Welded Dippers. 4 p. Harnischfeger Corp., Milwaukee, Wis.

Speed Control at Work. 32 p. Reeves Pulley Co., Columbus, Ind.

Porter Fireless Locomotives—Direct and Geared. 16 p. H. K. Porter Co., Pittsburgh, Pa.

The New Arc-Welding Technique. 20 p. Lincoln Electric Co., Cleveland, O.

Coming Events

January 11-16, 1937, New Orleans, La.—Annual convention and show, American Road Builders' Assn.

January 18-20, 1937, Cincinnati, O.—Annual convention and show, National Crushed Stone Assn. Netherland-Plaza Hotel.

January 18-20, 1937, Chicago, Ill.—National Concrete Contractors' Conference and equipment exhibit (Hotel Sherman) and annual conventions of National Concrete Masonry Assn. (Hotel Sherman), Cast Stone Institute (Bismarck Hotel), American Concrete Pipe Assn. (Edgewater Beach Hotel), and National Cinder Concrete Products Assn. (Hotel Sherman).

Users Report On Yardage Increases—

Read What They Say:

A Contractor Writes: **"It comes nearest to doing the work of a shovel bucket in rock, with all the advantages of the dragline that I believe possible."*

From A Gravel Plant Owner: **"Has increased our production at least 75%. To us the Page AUTOMATIC is the ONLY bucket for dragline work."*

A Strip Mine Operator Says: **"Can truthfully say that since putting on your AUTOMATIC we are stripping at least 50% more material."* *From letters in our files.

You also can increase your yardage and dragline profits! For information on a size and weight AUTOMATIC bucket for your machine and job—see your equipment dealer or write us direct. Free bulletin "The AUTOMATIC" gladly sent on request.

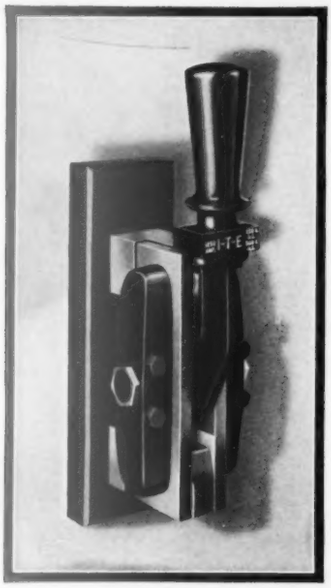
BUILT IN SIZES 3/8 to 15 CUBIC YARDS

"Dig with a PAGE AUTOMATIC"

Address Dept. F

PAGE ENGINEERING COMPANY

CLEARING POST OFFICE CHICAGO, ILLINOIS



The

KLAMP-TITE *Switch*

Recognized as a marked improvement in knife switch construction, the KLAMP-TITE holds its contacts under thousands of pounds constant pressure. One throw of the handle completes closing and clamping action.

An ideal switch for DUSTY installations

KLAMP-TITES add safety in cement plants and allied industries where dependability is law. *Send for Bulletin 1136.*

I-T-E CIRCUIT BREAKER CO.
Philadelphia, Pa. *Offices in Principal Cities*

UP IN THE AIR!

There was plenty of excitement down around Cleon Creek, Ind., recently when the Carl Furst Stone Co. took to lifting a small P&H bantam-weight shovel in and out of its deep limestone quarry. The big job was to clear up the debris left on the various stone ledges after the large stone slabs were removed. A guy derrick with special sling let the little machine down to one ledge after another where it did its work. After finishing the clean-up work at the bottom of the quarry, the "bantam-weight" crawled back to the loading spot where it was again swung into the air and back to ground level once more.

A. W. Daniels

Effective Jan. 1, A. W. Daniels became president and general manager of the Universal Crusher Co., Cedar Rapids, Ia., having purchased the controlling interest in this well-known concern. Mr. Daniels had been general sales manager at Chicago of the Taylor-Wharton Iron & Steel Co., and previously was vice-president of the American Manganese Steel Co. The new secretary-treasurer of the Universal concern will be H. F. Rikhoff, Detroit, Mich., formerly assistant secretary-treasurer of the American Manganese Steel Co. W. L. Harrison, who had been president since 1912 will remain on the board of directors.

HOWE Scales of every type for the rock products industry. Railway track, motor truck, batching, etc.

STOP *giving away* **YOUR PROFITS**

Delays in weighing truck loads; "over" or "under" weighing of trucks or car loads; guessing at weights—all cost you money and lose for you your plant's most important asset, customer good-will.

Eliminate these vital losses. Increase your production.

Earn More with a HOWE Weightograph

The Weightograph attaches to your present scale. It gives you fully 75 per cent faster weighing than a straight beam scale. No handling of weights and poises. No squinting at small beam figures. The exact load figures show on the ground glass screen of the Weightograph—large and clear, easy to read at a glance from wherever you stand.

One large producer declares that he sold 250 more tons of sand and gravel through the time saved by Weightograph weighing. It will save for you, too! Write today for information and prices, to The Howe Scale Company, Dept. P-1, Rutland, Vermont.

Branches and warehouses in principal cities

HOWE Scales
HOWE FAMOUS FIRST IN 1857

Incorporations

COLUMBIA CONCRETE PIPE CO., Yakima, Wash. Capital stock $25,000. W. P. Hews, J. P. Sherman and W. F. Paddock.

CURTIS FLUORSPAR CORP., Salem, Ky. Capital $10,000. J. R. Finkelstein and C. Curtis Steen.

FORRER STONE & SUPPLY CO., Madison, Wis. H. C. Forrer, H. Vaughn Norton and R. Wendell Martin.

COMMERCIAL ROCK CO., INC., Ontario, Ore. Capital stock $20,000. Chester A. Embree, George B. and L. G. Henly.

LA CROSSE SAND & GRAVEL CO., INC., La Crosse, Wis. Edwin B. Mayer, Martin R. McDonald and Ralph C. Hartman.

LONGVIEW CONCRETE PRODUCTS CO., Longview, Texas. Capital $3,000. Will C. Hurst, Pres.; L. P. Guice, v.-pres., and W. C. Hurst, Jr., sec.-tr., mgr.

DONNELLY SAND & GRAVEL CO., Cleveland, O. Capital $5,000. James C. Connell, Victor M. Todia, and Mary E. Donnelly.

SPRING GROVE SAND & GRAVEL CO., INC., Burlington, Iowa. Capital $25,000. A. Dahlquist, pres.; F. O. Block, v.-pres.; R. B. Swift, sec.-tr.

CRITTENDEN LIMESTONE CO., Marion, Ky. Chartered by Samuel Gugenheim and George P. Roberts.

Hard-surfacing electrodes, marketed under the trade-name "Seaco," are being offered the trade by the Stulz Sickles Co., Newark, N. J. The hard-surfacing material is for overlay welding of Manganal and manganese-steel castings, a combination which is said to give the ultimate resistance to impact and abrasion.

Shafer Bearing Corp., manufacturer of roller bearings, have moved the general offices of the company to 35 East Wacker Drive, Chicago, Ill. The company is also establishing a Chicago district sales office at 545 W. Washington Blvd.

HOW FAR WOULD GENEROSITY GO IN BUYING CONVEYOR BELTS

...not 26 times...

You might buy a poor conveyor belt once . . you might possibly be generous enough to give it the benefit of the doubt and try a second . . but, if Number Two fell down, you would be through. Only outstanding service could induce any company to repeat 26 times on the same make of belt.

Yet, this is the record of a large Eastern crushed stone company operating a number of plants of the most modern type. They bought their first Cincinnati belt back in 1923. It challenged the cost records of other belts in the plant . . proved a gilt edged investment. They bought another and another Cincinnati Belt. Each one showed the stamina and endurance that keeps down belt costs. Their last purchase was Number 26. That wasn't generosity . . it was sound business.

Why not try a Cincinnati Belt in your plant?

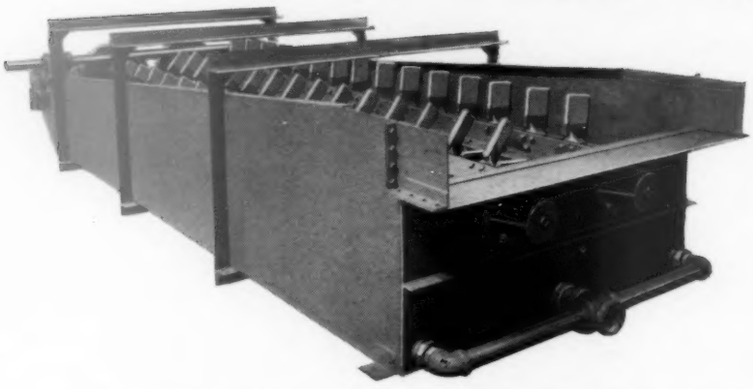
The Cincinnati Rubber Mfg. Company **Cincinnati, Ohio**

New York Detroit Chicago Boston Pittsburgh Buffalo Atlanta

CINCINNATI

CONVEYOR - - TRANSMISSION BELTS

WASHERS
AND DE-WATERERS



We also build Single and Double PADDLE TYPE LOG WASHERS for the difficult clay ball removal problems, as well as the Spiral Screw Type illustrated by cut on this page. The Paddle Type Log machines have all the features of design and operation used in the Spiral Screw Type.

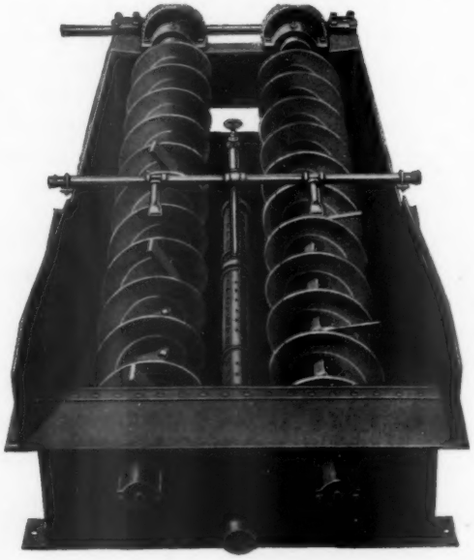
Let us send full details of any of these machines. Simply advise what your problem is, whether washing sand or gravel, and what your capacity requirements are. We will conduct a thoro investigation without obligation on your part, and if an EAGLE will solve your problem we will recommend the proper machine and guarantee performance. Fair enough, isn't it?

WRITE TODAY!

Whatever your washing problem there is an EAGLE that will solve it, either of the Spiral Screw, or Paddle Log Washer Type, with greater efficiency and less operating cost. Take advantage of our long experience as pioneers in this equipment for the Sand & Gravel Industry.

The more difficult the removal of the foreign material, the more reason you should investigate EAGLE Washers. Different sizes meet your capacity requirements, for washing either sand or gravel. The sand washers differ in that they are longer to give complete dewatering, with higher tub sides to give a deep settling basin. Features of design which can only be obtained in EAGLE machines, account for their installation in all sections of the country. If you require only de-watering we build a machine identical with the washer except that the up-current water feature is eliminated from the bottom of the tub. It is possible in this machine to float off light foreign material. Sand moisture content to, from 4 to 6%.

Double — Spiral Screw Type



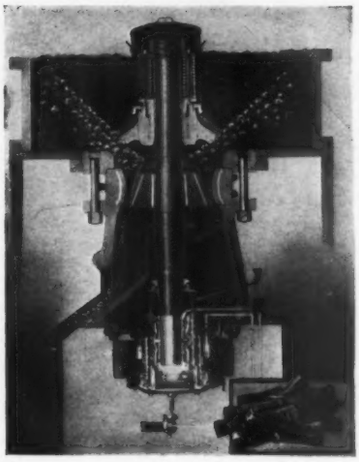
EAGLE "SWINTEK" SCREEN NOZZLE LADDERS

Will at least double your capacity in the hydraulic pumping of either sand, or of gravel, thru agitation and resultant constant even flow of material. In gravel winning the ladder will eliminate all stoppages by oversize material and deposit it out of the pumping zone. This simply means no pumping delays, just a steady run, 24 hours if you wish. Secure material orders when you have the chance by having the capacity to do it.

EAGLE Products Include:

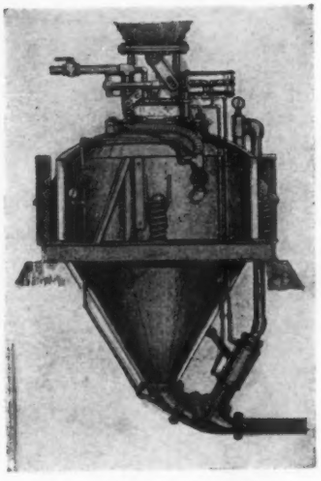
EAGLE Double Roll Crusher
EAGLE Shale Planer
Olson Self-dumping Cages
Specialized Mining Equipment
EAGLE Dry and Wet Pans
EAGLE Grinder

EAGLE IRON WORKS
DES MOINES - IOWA

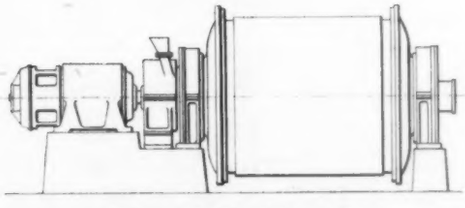


Secondary Gearless Gyratory Crusher

Vibrating Screen



Pneumatic Transport System



Gearless Air-Swept Tube Mill

MAKE A COMMON SENSE 1937 RESOLUTION—

TO USE KENNEDY PRODUCTS

THE MACHINERY WITH THE TROUBLES LEFT OUT

for the following reasons:

1. To Make Money for the Owner
2. To Obtain Lowest Cost of Production
3. To Consume Minimum Power
4. To Insure Continuity of Operation
5. To Get Better Sizing
6. To Obtain Maximum Efficiency

May We Have One of Our Engineers Call On You to Discuss Our Products? Please Write or Wire

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Pit and Quarry Directory. (The Directory Section of the Handbook, published separately). Complete alphabetical and geographical lists of nonmetallic-mineral producing and manufacturing companies and their plants. 1936 ed., 254 pages, 8½ x 11½, paper.

Cements, Limes and Plasters. By Edwin C. Eckel, C.E. Third edition, 699 pages, 6x9, 161 figs., 269 tables; cloth. A complete and comprehensive review of the raw materials, methods of manufacture and properties of the finished product, of all kinds of cementing materials used for construction.

Portland Cement. By Richard K. Meade. Third edition; revised and enlarged; XII+707 pages, illustrated. The composition, raw materials, manufacture, testing and analysis in the Portland cement industry.

Non-Metallic Minerals. By Raymond B. Ladoo. 686 pages, 6x9, 50 diagrams. A comprehensive book on the composition and properties, methods of mining and preparation, market values, extent and nature of markets, specifications and tests and uses of all non-metallic minerals of commercial importance, except fuels and natural bitumens and hydrocarbons.

The Pneumonokonioses (Silicosis) Literature and Laws of 1934. International abstracts, extracts and reviews of the pneumonokonioses and their associated diseases and subjects. By George C. Davis, M.D., Ella M. Salmonsen and Joseph L. Earlywine. 490 pages, 6x9, cloth.

Mining Engineers' Handbook. Compiled by a staff of specialists; Robert Peele, editor-in-chief. Second edition. For engineers concerned with the development and management of mines, and those interested in the construction details involved in the installation of plants. Covers mining and metallurgy, and allied subjects necessary to the mining engineer, and such data on machinery, power plants, electric transmission and structural design as he may need in the field.

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The Stone Industries. By Oliver Bowles, Supervising Engineer, U. S. Bureau of Mines. Covering the building-, decorative-, and crushed-stone industries in all their ramifications. It describes rocks and covers the geology and distribution of developed deposits in every state. It embraces the qualities of stones, their uses, methods of quarrying and manufacture, and marketing.

Excavation Machinery, Methods and Costs. By A. B. McDaniel, Principal Engineer, Construction Division, U. S. Army. 530 pages 6x9; illustrated. A complete handbook on excavating in mines, pits and surface workings.

Diesel Engineering Handbook. Edited by L. H. Morrison, editor of "Diesel Power." Contains more than 800 pages devoted to the history of the development of the Diesel engine, and descriptive matter concerning the many models now on the market. Profusely illustrated.

The Properties of Silica. By Robert B. Sosman. A monograph on silica in its various phases and transformations, discussing its structure and symmetry, its thermal and mechanical energy, its electric and magnetic properties, and its uses and applications in industry. 856 pages.

Bearing Metals and Bearings. By W. M. Corse. 383 pages, illustrated. A survey of the fundamental principles and practices involved in the selection of bearings and bearing metals.

Standard Practices (for Diesel-engine owners and operators). Official publication of the Diesel Engine Manufacturers' Assn. Fifteen chapters discussing construction, operation, costs, performance, fuel and lubricating systems, generators and other electrical equipment, etc.

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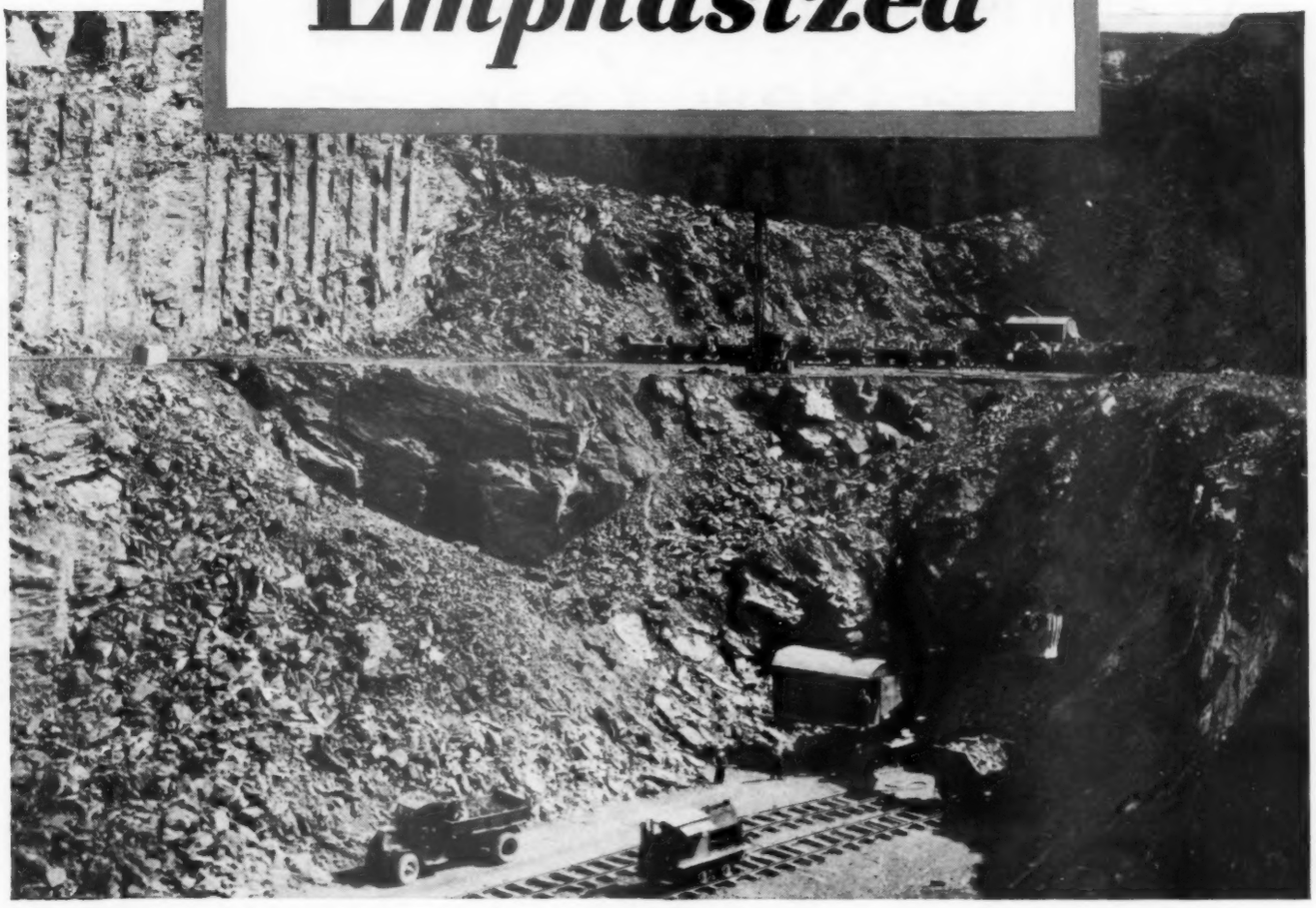
WHERE *Efficiency* IS *Emphasized*



AS indicated in the accompanying illustration, the Lehigh Portland Cement Company's workings at Sandts Eddy, Pa., is an excellent example of efficient large scale production. Here smooth operation with minimum waste energy is a primary consideration.

Naturally Cordeau-Bickford Detonating Fuse is used. Users of Cordeau recognize that true efficiency starts with the blast. Each charge must result in proper fragmentation, easier removal.

Consider Cordeau and its other advantages: more work from explosives through direct detonation of each cartridge which goes with the force of a primer cartridge; and charges fired in split second rotation for relief of burden. Here is perfect teamwork where teamwork counts.

Let us send you, free, a copy of the Cordeau book.

CB59

CORDEAU-BICKFORD DETONATING FUSE

THE ENSIGN-BICKFORD COMPANY, SIMSBURY, CONN.

MAKERS OF ENSIGN-BICKFORD SAFETY FUSE SINCE 1836

An Old-Fashioned Meeting Starts the New Year

An old fashioned Crushed Stone meeting, this 20th annual convention of the National Crushed Stone Association—crammed full with topics of timely interest for every crushed stone producer in the United States and Canada—presented by speakers of national reputation.

Future Highway Policies
Business Summary
"Stone Sand"—Its Production and Use
Significant Highway Investigations
Progress in Rail Transportation
Agstone in Federal Soil Improvement Program
Employer-Employee relationships
Symposium on Silicosis
Legislative Clinic

These and other subjects of equal importance will feature this meeting. The Manufacturers' Division Exposition alone will more than pay you for your attendance.

With the pulse of the Nation beating upward and onward, no convention in our memory has been held at a more auspicious time.

ATTEND—Share in the benefits of this annual gathering—your friends and fellow producers will be there. Make your reservations NOW!

20th ANNUAL CONVENTION

NATIONAL CRUSHED STONE ASSOCIATION
NETHERLAND PLAZA HOTEL • • • CINCINNATI, OHIO
JANUARY 18, 19 and 20, 1937

YOUR SURPLUS AGGREGATE

MEN OF FORESIGHT IN THE AGGREGATE INDUSTRY

are now cashing in on the rapidly increasing demand for permanent building material. Consolidated Rock Products Co., Brooksville, Fla.—F. A. Rider Sand & Gravel Co., Vestal, N. Y.—Riverside Sand & Gravel Co., Thiensville, Wis.—W. P. Rose, Goldsboro, N. C. —Consolidated Quarries of Georgia—Georgia Mineral Products Co., Tate, Ga.—Bayer-Brice Co., Flint, Mich.—are some of the producers that are profitably converting their surplus or waste aggregate into DUNBRIK and DUNSTONE — a superior trademarked building material.

TODAY'S BUILDING MARKET DEMANDS

lower cost in permanent, colorful construction. With your aggregate and the automatic DUNBRIK Machine, you can produce new and better building units that permit hollow and ashlar types of construction at cost level of frame.

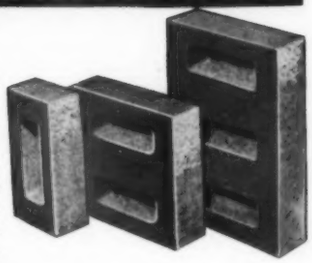
WE EQUIP YOU

with new and revolutionary line production machinery, permitting large production with only one or two men. Equipment costs but a fraction of what would be required for other processes of equal capacity.

HERE IS THE OUTSTANDING OPPORTUNITY

for you in your locality. Why not investigate now. It will cost you nothing, and may mean many thousands of dollars to you. Send in the coupon today and get the whole story.

DUNBRIK



A superior standard size Brick that is always accurate and true in all dimensions. Its recessed design saves 20% in cement and forms a keyed mortar bond. Its faces are machine trowelled and water repellent. Its extreme density gives a compressive strength beyond any known building requirement.

DUNSTONE

A super building unit that you can manufacture in sizes which are equal to two or three standard double and triple brick. This super unit is particularly adaptable to today's trend of modern architectural design at costs far below competitive materials.

OVER FORTY COLORS

Today's Builders demand colorful low cost construction. With DUNBRIK and DUNSTONE you can fulfill this demand to the fullest degree. You can supply these products in a range of over 40 colors, shades and textures, in factory faced units or you can apply a permanent facing over the completed building in any desired color.

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420 W. 24th St.,
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Please send your book "4 Keys to Manufacturing Success," outlining this timely opportunity for aggregate producers.

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BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified.

Index to Advertisers on Page 166

Aggregate-Bituminizing Plants
Hetherington & Berner, Inc.
*Warren Brothers Roads Co.

Agitating Ladders (Dredge)
*Eagle Iron Works
Pettibone-Mulliken Co.

Agitators, Thickeners and Slurry Mixers
*Hardinge Co.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Aggremeters
*Blaw-Knox Co.

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*Curtis Pneumatic Machy. Co.
*Fuller Co.
Gardner-Denver Co.
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*Gruendler Crusher & Pulverizer Co.
*Hardinge Co.
*Raymond Bros. Impact Pulv. Co.
*Sly Mfg. Co., W. W.
Sturtevant Mill Co.
Universal Road Machy. Co.
*Williams Patent Crusher & Pulverizer Co.

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Chain Belt Co.
Chicago Steel Foundry Co.
Manganese Steel Forge Co.

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American Manganese Steel Co.
Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link Belt Co.
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*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Manganese Steel Forge Co.

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*Hardinge Co.
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Bearings (Roller)
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Belt Fasteners
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*Link-Belt Co.
Republic Rubber Co.
*Robins Conveying Belt Co.

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Goodyear Tire & Rubber Co.
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Belt Lacings
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Belts (Fan)
Goodyear Tire & Rubber Co.
Republic Rubber Co.

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*Traylor Engr. & Mfg. Co.
Universal Crusher Co.

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*Allen-Sherman-Hoff Co.

Bins (Concrete)
Long Co., M. A.
Marietta Concrete Corp.

Bins (Steel)
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*Hendrick Mfg. Co.
Hetherington & Berner, Inc.
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*Jeffrey Mfg. Co.
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Blocks (Sheave)
American Manganese Steel Co.
Haiss Mfg. Co., Geo.
*Sauerman Bros., Inc.

Bodies (Motor Truck)
Hug Co.

Bodies (Motor Truck, Concrete Mixing)
*Blaw-Knox Co.
Chain Belt Co.
Concrete Transport Mixer Co.
Jaeger Machine Co.

Boots (Rubber)
Goodyear Tire & Rubber Co.

Borings, Core
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Blowers
*Sly Mfg. Co., W. W.

Breakers (Rock)
Atlantic Steel Co.

Brick Machines (Concrete)
Dunn Mfg. Co.

Brick Manufacturing Equipment
Dunn Mfg. Co.

Bronze Work (Ornamental)
Buffalo Wire Works.
National Wire Cloth Co.
*Tyler Co., W. S.

Buckets (Dump)
Dempster Bros., Inc.

Bucket Elevators (See Conveyors and Elevators)

Buckets (Clamshell, Orange-Peel, Etc.)
*Blaw-Knox Co.
Haiss Mfg. Co., Geo.
*Harnischfeger Corp.
*Link-Belt Co.
Owen Bucket Co.
Pettibone-Mulliken Co.
Wellman Engr. Co.

Buckets (Dragline—Cableway)
American Manganese Steel Co.
*Bucyrus-Erie Co.
*Link-Belt Co.
*Page Engr. Co.
*Sauerman Bros., Inc.
Wellman Engr. Co.

Buckets (Elevator and Conveyor)
Chain Belt Co.
Cross Engr. Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
Pettibone-Mulliken Co.
*Robins Conveying Belt Co.
Smith Engr. Works

Buggies (Dump)
*Koehring Co.
LeTourneau, Inc., R. G.

Bulldozers
*Bucyrus-Erie Co.
LeTourneau, Inc., R. G.

Cableways
*American Steel & Wire Co.
*Leschen & Sons Rope Co., A.
*Link-Belt Co.
*Page Engr. Co.
*Roebling's Sons Co., John A.
*Sauerman Bros., Inc.

Calcium Chloride
Calcium Chloride Ass'n.

Capstans (See Winches and Capstans)

Car Dumpers
*Link-Belt Co.
Wellman Engr. Co.

Car Pullers
*Jeffrey Mfg. Co.
*Link-Belt Co.

Cars (Quarry and Gravel Pit)
*Austin-Western Road Machy. Co.

Carriers
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works

Carryalls
*Koehring Co.
LeTourneau, Inc., R. G.

Car Wheels — (See Wheels — Car)

Castings
American Manganese Steel Co.
Chain Belt Co.
Chicago Steel Foundry Co.
*Eagle Iron Works
*Hardinge Co.
Hetherington & Berner, Inc.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
Pettibone-Mulliken Co.
*Robins Conveying Belt Co.

Cement Pumps (See Pumps; Air Pumps; Pumps, Cement Slurry; Pumps, Bulk Cement)

Chain Attachments
*Jeffrey Mfg. Co.

Chain (Dredge and Shovel)
Manganese Steel Forge Co.

Chain Drives
Chain Belt Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Chain (Elevating and Conveying)
American Manganese Steel Co.
Chain Belt Co.
Cross Engr. Co.
Haiss Mfg. Co., Geo.
Industrial Brownhoist Corp.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
*Portable Machy. Corp.

Chute Lining (Rubber)
Goodyear Tire & Rubber Co.

Chutes and Chute Liners
American Manganese Steel Co.
Chain Belt Co.
Cross Engr. Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Smidth & Co., F. L.

Classifiers
*Deister Machine Co.
*Hardinge Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
Simplicity Engr. Co.

Clips (Wire Rope)
*American Steel & Wire Co.
*Leschen & Sons Rope Co., A.
*Roebling's Sons Co., John A.

Clutches
*Jeffrey Mfg. Co.
*Link-Belt Co.

Coal-Pulverizing Equipment
*Allis-Chalmers Mfg. Co.
Bonnot Co.
Gay, Rubert M.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Raymond Bros. Impact Pulv. Co.
*Smidth & Co., F. L.
Universal Road Machy. Co.
*Williams Patent Crusher & Pulverizer Co.

Compressors (See Air Compressors)

Compressors (Paint Spray)
*Curtis Pneumatic Machy. Co.

Concentrators (Slurry)
*Deister Concentrator Co.

Concrete Breakers (Air)
*Chicago Pneumatic Tool Co.
Gardner-Denver Co.
*Ingersoll-Rand Co.

Concrete Mixers
*Blaw-Knox Co.
Jaeger Machine Co.
*Koehring Co.

Concrete Slab-Raising Equipment (Mud-Jacks)
*Koehring Co.

Condensers
*Chicago Pneumatic Tool Co.
*Ingersoll-Rand Co.

Cones (Sand-Washing)
Iowa Mfg. Co.
*Link-Belt Co.
Smith Engr. Works

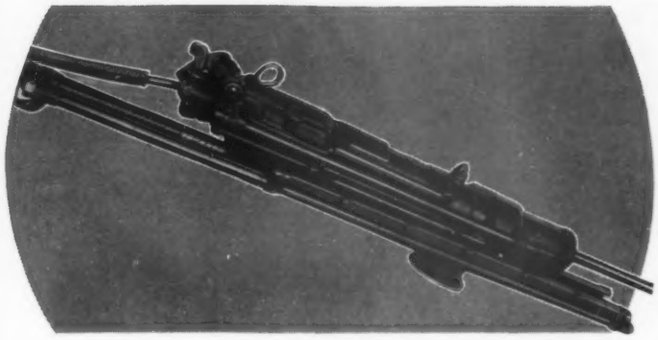
Contractors and Builders
Long Co., M. A.

Conveyor Belting (See Belting)

Conveyor Idlers and Rolls
Chain Belt Co.
Haiss Mfg. Co., Geo.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

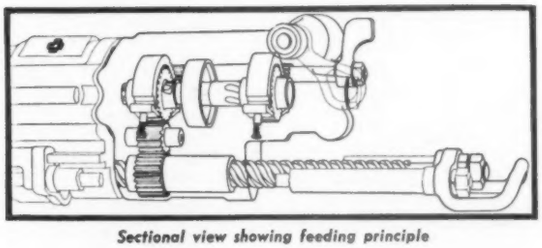
* See also information in the 1936 Pit and Quarry HANDBOOK.

Smoother Operation No Vibration ... In the NEW Gardner-Denver MOTOR FEED Drifter



In the new Gardner-Denver Motor Feed Drifter, Gardner-Denver produces an entirely new principle in feeding drifting drills.

The Gardner-Denver Motor Feed does not utilize vibration . . . has powerful return . . . close feed regulation.



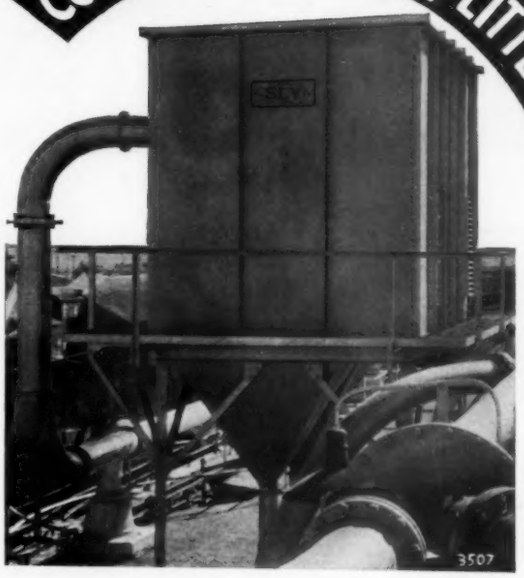
Sectional view showing feeding principle

• *The Gardner-Denver Motor Feed Drifter is available in two models: AF-79, a 3" drifter, AF-89, a 3½" drifter*

GARDNER-DENVER CO., Quincy, Illinois
Since 1859

GARDNER-DENVER
MORE FOOTAGE PER SHIFT—EVERY SHIFT

COSTS LITTLE TO BUY, LITTLE TO OPERATE.



Sly Dust Filter on roof of cement silo.

A Positive Way to END DUST

The solution of your dust problem is surprisingly simple and inexpensive when a Sly Dust Filter is chosen for the job.

The Sly Dust Filter gives you greater filter area per square foot of space—simplest and most effective cleaning device for removal of fine dust adhering to cloth bags, without injury to cloth. Wire spacers inside the bags prevent contact of cloth surfaces under air load; a compression spring keeps bags taut, thereby maintaining highest efficiency at all times. And when you wish to change a bag you can do it quickly and easily without interruption in service of filter.

Sly specializes in complete dust control installations, including structural supports, motors, hoods, piping, fans and field erecting service. *What are your dust problems? May we analyze them!*

SLY DUST FILTERS end the dust nuisance in—

- **ROCK CRUSHING**
  - Trap Rock
  - Slate
  - Ore
  - Silica
  - Limestone
- **GRINDING**
  - Rock
  - Cement Clinker
  - Gypsum
  - Ore
- **CONVEYORS**
- **ELEVATORS**
- **SCREENING**
- **AIR PUMPING SYSTEMS**
- **PACKING OPERATIONS**
- **BAG CLEANING**
- **SILOS**

CLOTH BAG
SLY Dust Filters
FOR DUST CONTROL
SUPPRESSION···POSITIVE COLLECTION···DISPOSAL

THE W. W. SLY MANUFACTURING CO.
4726 Train Ave., Cleveland, Ohio

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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*Portable Machy. Corp.
*Robins Conveying Belt Co.

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Bacon, Inc., Earle C.
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Chicago Steel Foundry Co.
Cross Engr. Co.
*Fuller Co.
*Gruendler Crusher & Pulverizer Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Industrial Brownhoist Corp
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
*Portable Machy. Corp.
*Robins Conveying Belt Co.
Smith Engr. Works
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Universal Road Machy. Co.

Conveyors (Pneumatic)
*Fuller Co.

Conveyors (Ready-Mixed Concrete)
*Blaw-Knox Co.
Chain Belt Co.
Concrete Transport Mixer Co.
Haiss Mfg. Co., Geo.
Jaeger Machine Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Conveyors (Screw)
*Jeffrey Mfg. Co.

Conveyors (Vibrating)
*Jeffrey Mfg. Co.

Coolers (Clinker)
*Allis-Chalmers Mfg. Co.
*Smidth & Co., F. L.

Coolers (See Kilns and Coolers—Rotary)

Correcting Basins
*Smidth & Co., F. L.

Couplings (Flexible and Shaft)
Erie Pump & Engine Works
Huron Industries Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Couplings (Hose)
*Chicago Pneumatic Tool Co.
*Ingersoll-Rand Co.

Cranes (Crawler and Locomotive)
*Austin-Western Road Machy. Co.
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
*Harnischfeger Corp.
Industrial Brownhoist Corp
*Koehring Co.
*Lima Locomotive Works, Inc.
*Link-Belt Co.
Michigan Power Shovel Co.
Northwest Engr. Co.
Thew Shovel Co.

Cranes (Electric Traveling)
*Curtis Pneumatic Machy. Co.
*Harnischfeger Corp.

Cranes (Overhead)
*Curtis Pneumatic Machy. Co.
*Harnischfeger Corp.

Crusher Parts
American Manganese Steel Co.
*American Pulverizer Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
Pettibone-Mulliken Co.

Crushers (Cone)
Nordberg Mfg. Co.

Crushers (Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Bonnot Co.
*Dixie Machy. Mfg. Co.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng Corp
Sturtevant Mill Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Jaw and Gyratory)
*Allis-Chalmers Mfg. Co.
*Austin-Western Road Machy. Co.
Bacon, Inc., Earle C.
*Gruendler Crusher & Pulverizer Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
New Holland Machine Co.
Nordberg Mfg. Co.
Smith Engr. Works
*Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Universal Road Machy. Co.

Crushers (Ring)
*American Pulverizer Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Roll)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Bonnot Co.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
*Robins Conveying Belt Co.
Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Rotary)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Bonnot Co.
New Holland Machine Co.
*Williams Patent Crusher & Pulverizer Co.

Crushing Rolls
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Austin-Western Road Machy. Co.
*Bartlett & Snow Co., C. O.
Bonnot Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Diesel Engines (See Engines—Diesel)

Dipper Parts
American Manganese Steel Co.
*Bucyrus-Erie Co.
Pettibone-Mulliken Co.

Dippers and Teeth (Power Shovel)
American Manganese Steel Co.
*Bucyrus-Erie Co.
*Koehring Co.
Pettibone-Mulliken Co.

Dragline Cableway Excavators
*Link-Belt Co.
*Page Engr. Co.
*Sauerman Bros., Inc.

Dragline Excavators
*Austin-Western Road Machy. Co.
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
*Harnischfeger Corp.
*Koehring Co.
*Lima Locomotive Works, Inc.
*Link-Belt Co.
Michigan Power Shovel Co.
Northwest Engr. Co.
*Page Engr. Co.
Thew Shovel Co.

Draglines (Walking)
*Bucyrus-Monighan Co.

Dredges
*Bucyrus-Erie Co.
Hetherington & Berner, Inc.
*Morris Machine Works

Drilling Accessories
*Chicago Pneumatic Tool Co.
Gardner-Denver Co.
*Ingersoll-Rand Co.

Drill Bits
*Chicago Pneumatic Tool Co.
*Ingersoll-Rand Co.
Timken Roller Bearing Co.

Drilling Contractors
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Blast-Hole)
*Bucyrus-Armstrong Co.
*Chicago Pneumatic Tool Co.
Gardner-Denver Co.
*Ingersoll-Rand Co.

Drills (Core)
Hoffman Bros. Drilling Co.
*Ingersoll-Rand Co.
Pennsylvania Drilling Co.

Drills (Diamond)
*Chicago Pneumatic Tool Co.
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Hand-Hammer)
*Chicago Pneumatic Tool Co.
Gardner-Denver Co.
*Ingersoll-Rand Co.

Drills (Rock)
*Bucyrus-Armstrong Co.
*Chicago Pneumatic Tool Co.
Gardner-Denver Co.
*Ingersoll-Rand Co.
*Jeffrey Mfg. Co.

Drill Sharpening Machinery
Gardner-Denver Co.
*Ingersoll-Rand Co.

Drill Steel
*Chicago Pneumatic Tool Co.
*Ingersoll-Rand Co.

Drills (Well) (See Drills—Blast-Hole)

Drives (Multiple, Belt, Chain, Rope)
*Allis-Chalmers Mfg. Co.
Chain Belt Co.

Dryers
*Allis-Chalmers Mfg. Co.
Bonnot Co.
*Hardinge Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mch. Co.
McLanahan and Stone Corp.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.

Dry-Ice Equipment
Lummus Co.

Dust Arresters
*Blaw-Knox Co.
*Sly Mfg. Co., W. W.
*Western Precipitation Co.

Dust Collecting Systems
*Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
*Blaw-Knox Co.
*Raymond Bros. Impact Pulv. Co.
*Sly Mfg. Co., W. W.
*Western Precipitation Co.

Dust Conveying Systems
*Allen-Sherman-Hoff Co.
*Blaw-Knox Co.
*Fuller Co.
*Sly Mfg. Co., W. W.
*Western Precipitation Co.

Dust Filters
*Western Precipitation Co.

Dust Handling Systems (Hydro Vacuum)
*Allen-Sherman-Hoff Co.

Dynamite (See Explosives)

Electrical Equipment
*Allis-Chalmers Mfg. Co.
*Fairbanks, Morse & Co.

Electrodes (Welding)
Stulz-Sickles Co.

Elevator Belting (See Belting)

Elevators (See Conveyors and Elevators)

Eliminators (Soft Stone) (See Soft Stone Eliminators)

Engineers
*Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Bonnot Co.
Cross Engr. Co.
*Fuller Co.
Hetherington & Berner, Inc.
Iowa Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Long Co., M. A.
Lummus Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Smidth & Co., F. L.
Sturtevant Mill Co.

Engine Generator Sets
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Engines (Diesel)
Caterpillar Tractor Co.
*Chicago Pneumatic Tool Co.
*Fairbanks, Morse & Co.
*Ingersoll-Rand Co.
Nordberg Mfg. Co.
*Page Engr. Co.

Engines (Internal-Combustion)
Caterpillar Tractor Co.
*Chicago Pneumatic Tool Co.
*Fairbanks, Morse & Co.
*Ingersoll-Rand Co.
Nordberg Mfg. Co.
*Page Engr. Co.
Wilson, K. R.

Engines (Steam)
*Ingersoll-Rand Co.
*Morris Machine Works
Nordberg Mfg. Co.

Excavating Machinery (See Shovels; Cranes; Buckets, etc.)

Excavators—Shallow Grading (Bucket Elevator Type)
Haiss Mfg. Co., Geo.

Fabricating (Electric Arc and Oxy-Acetylene)
Lummus Co.
Stultz-Sickles Co.

Fans (Exhaust)
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Feeders
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Bonnot Co.
Chain Belt Co.
*Fuller Co.
*Hardinge Co.
Huron Industries Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
Universal Crusher Co.

Fencing (Woven Wire)
Buffalo Wire Works Co.

Floor Sweeping Systems (Hydro Vacuum)
*Allen-Sherman-Hoff Co.

Forges (Oil)
Gardner-Denver Co.

Fuses (Detonating)
*Ensign-Bickford Co.

Gaskets
*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Gasoline Engines (See Engines—Internal-Combustion)

Gas Producers
Wellman Engr. Co.

Gates (Bin) (See Bin Gates)

Gates (Clamshell)
Haiss Mfg. Co., Geo.
*Link-Belt Co.

Gears (Herringbone)
Chain Belt Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Gears and Pinions
Chain Belt Co.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Pettibone-Mulliken Co.

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Generator Sets (Engine)
Wilson, K. R.

Generator Sets (Motor)
Wilson, K. R.

Glass Sand Equipment
Lewistown Foundry & Machine Co.

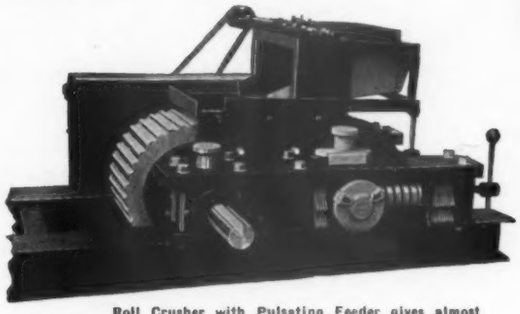
Goggles
Cover, H. S.

* See also information in the 1936 Pit and Quarry HANDBOOK.

NEW HOLLAND

CRUSHERS

Start 1937 with the advantage of cost reducing equipment. The New Holland line of Screens, Crushers and Belt Conveyors is built for record low maintenance and maximum service under the most difficult conditions of operation. Write for Bulletin containing complete specifications.



Roll Crusher with Pulsating Feeder gives almost double the usual capacity. Rib shell construction increases angle of grip and reduces dust.

Vibrating Screen for Light or Heavy Duty built in standard sizes with one, two or three decks. Rubber cushioned cloth and bumpers. High grade bearings, fully enclosed and dust-tight.

SCREENS

NEW HOLLAND MACHINE CO.

P. O. Box No. 200 — New Holland, Penna.

OFF TO A GOOD START IN 1937

. . . with Hendrick Products

in your crushing and screening plants

PERFORATED PLATE . . . for vibrating, revolving and shaking screens made to the traditional Hendrick standard of quality which insures maximum production and longest service life . . . with the shape of opening best suited for the job, round, square, hexagonal, slotted and the Hendrick special design Squaround*. They can be supplied in any appropriate metal including high carbon and abrasive-resisting steel. Many operators prefer Hendrick high-carbon, heat-treated double corrugated plate . . . a more vigorous screening medium.

Hendrick Perforated Plate is described in greater detail in this new, illustrated book . . . "Perforated Plate." It will provide an excellent "buyer's guide" for your 1937 requirements. Write for a copy.

ELEVATOR BUCKETS . . . They look alike but often they're not. For years Hendrick has been supplying critical buyers with buckets of uniform high strength that fit easily.

TESTING SCREENS . . . Hendrick carries a complete line of testing screens . . . a model to suit every purpose . . . from the portable Hendrick hand-testing outfit to the rugged and efficient Weston Testing Screen.

HENDRICK MANUFACTURING CO.

39 Dundaff Street, Carbondale, Pa.

Sales Offices in Principal Cities. Please Consult Telephone Directory

*Reg. U. S. Pat. Off.

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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*Robins Conveying Belt Co.
Smith Engr. Works
*Traylor Engr. & Mfg. Co.
Universal Road Machy. Co.

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Hoists
*Chicago Pneumatic Tool Co.
*Curtis Pneumatic Machy. Co.
Gardner-Denver Co.
Hetherington & Berner, Inc.
*Ingersoll-Rand Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
O. K. Clutch & Machy. Corp.
*Sauerman Bros., Inc.
Smith Engr. Works

Hoppers
*Hendrick Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.

Hose (Air, Steam and Water)
*Chicago Pneumatic Tool Co.
*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.
*Ingersoll-Rand Co.
Republic Rubber Co.

Hose (Radiator-Engine Cooling)
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Republic Rubber Co.

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Idlers
American Manganese Steel Co.
Chain Belt Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Portable Machy. Corp.
*Robins Conveying Belt Co.
Smith Engr. Works

Kilns and Coolers (Rotary)
*Allis-Chalmers Mfg. Co.
Bonnot Co.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Kilns (Vertical)
*Hardinge Co.

Kominuters
*Smidth & Co., F. L.

Lime-Handling Equipment
*Fuller Co.
*Hardinge Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Raymond Bros Impact Pulv. Co.
*Robins Conveying Belt Co.

Lime and Hydrating Plants
*Hardinge Co.

Lime Kilns
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Linings (Ball- and Tube-Mill (See Mill Liners and Linings)

Loaders and Unloaders
*Fuller Co.
Haiss Mfg. Co., Geo.
Industrial Brownhoist Corp.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Portable Machy. Corp.
*Robins Conveying Belt Co.

Locomotives (Electric, Gas, Kerosene and Steam)
*Lima Locomotive Works

Locomotives (Storage Battery)
*Jeffrey Mfg. Co.

Locomotives (Trolley-Battery)
*Jeffrey Mfg. Co.

Magnetic Pulleys (See Pulleys, Magnetic)

Manganese Steel
American Manganese Steel Co.
Manganese Steel Forge Co.
Pettibone-Mulliken Co.

Manganese Steel (Plates and Sheets)
American Manganese Steel Co.
Manganese Steel Forge Co.
Pettibone-Mulliken Co.

Mask (Gas)
Cover, H. S.

Mechanical Rubber Goods
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Goodyear Tire & Rubber Co.
Republic Rubber Co.

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*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Smidth & Co., F. L.

Mills (Ball, Tube, etc.)
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*Hardinge Co.

Mills (Grinding) (See also Crushers—Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Bonnot Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdy. & Mch. Co.
*Raymond Bros. Impact Pulv. Co.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.
Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Motors and Generators
*Allis-Chalmers Mfg. Co.
*Fairbanks, Morse & Co.
*Harnischfeger Corp.
Wilson, K. R.

Motors (Internal-Combustion) (See Engines—Internal-Combustion)

Motor Trucks
General Motors Corp.
Hug Co.

Motor Trucks (Dual Rear Axle Drive Units)
Thornton-Tandem Co.

Nails
*American Steel & Wire Co.

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Buffalo Wire Works Co.
*Tyler Co., W. S.

Nozzles (Gravel Washing)
*Deister Concentrator Co.

Nozzles (Hydraulic) (See Guns—Hydraulic)

Nozzles (Spray)
*Deister Concentrator Co.

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Buffalo Wire Works Co.
National Wire Cloth Co.

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Jaeger Machine Co.
*Koehring Co.

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*Allis-Chalmers Mfg. Co.
Chicago Perforating Co.
Cross Engr. Co.
*Hendrick Mfg. Co.

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Taylor Forge & Pipe Works

Pipe Flanges
Hetherington & Berner, Inc.
Taylor Forge & Pipe Works

Pipe Forms (Concrete)
Universal Concrete Pipe Co.

Pipe Machines (Concrete)
Universal Concrete Pipe Co.

Plants (Aggremeter) (See Aggremeter Plants)

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Portable Conveyors
*Fuller Co.
Haiss Mfg. Co., Geo.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Portable Machy. Corp.
*Robins Conveying Belt Co.

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*Gruendler Crusher & Pulverizer Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Portable Engines (See Engines—Internal Combustion)

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Power Cables (Rubber Clad)
*American Steel & Wire Co.

Power Shovels (See Shovels, Electric, Internal-Combustion and Steam)

Proportioning Equipment
*Blaw-Knox Co.

Pulleys
Huron Industries Co.

Pulverized Fuel Systems
Gay, Rubert M.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Raymond Bros. Impact Pulv. Co.
Universal Road Machy. Co.

Pulverizers (See also Crushers: Mills: etc.)
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Bonnot Co.
*Gruendler Crusher & Pulverizer Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
New Holland Machine Co.
*Raymond Bros. Impact Pulv. Co.
*Smidth & Co., F. L.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Pump Parts
Pettibone-Mulliken Co.

Pump Valves (See Valves, Pump)

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*Chicago Pneumatic Tool Co.
*Fuller Co.
*Ingersoll-Rand Co.

Pumps (Bulk Cement)
*Fuller Co.

Pumps (Cement Slurry)
*Allen-Sherman-Hoff Co.
*Morris Machine Works
*Smidth & Co., F. L.

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*Fairbanks, Morse & Co.
Hetherington & Berner, Inc.
*Ingersoll-Rand Co.
Kansas City Hay Press Co.
*Morris Machine Works
Pettibone-Mulliken Co.

Pumps (Dredging)
*Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
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*Bucyrus-Erie Co.
Erie Pump & Engine Works
*Fairbanks, Morse & Co.
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
*Morris Machine Works
Pettibone-Mulliken Co.

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*Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Erie Pump & Engine Works
*Fairbanks, Morse & Co.
Hetherington & Berner, Inc.
*Ingersoll-Rand Co.
Kansas City Hay Press Co.
*Morris Machine Works
Pettibone-Mulliken Co.

Pumps (Sump)
*Chicago Pneumatic Tool Co.

Pumps (Vacuum)
*Chicago Pneumatic Tool Co.
*Fuller Co.

Respirators
Cover, H. S.

Rock Breakers
Atlantic Steel Co.

Rock Drills (See Drills—Rock)

Rod Mills
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Traylor Engr. & Mfg. Co.

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Stulz-Sickles Co.
Taylor-Wharton Iron & Steel Co.

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Rubbish Burners
Cross Engr. Co.

Safety Equipment
Cover, H. S.

Sand and Gravel Handling Equipment
*Jeffrey Mfg. Co.
*Link-Belt Co.

Sand Separators
*Jeffrey Mfg. Co.
*Link-Belt Co.

* See also information in the 1936 Pit and Quarry HANDBOOK.

Fine Screening by THE Leahy

In one sentence a Producer gives his experience with a typical Leahy installation:

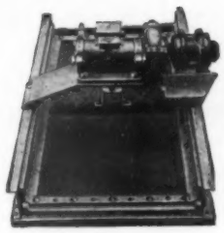
We use the Leahy Screen for screening and grading cinders used in the manufacture of "Straub" Cinder Units, and are well pleased with its performance.

Very truly yours,

B. R. BIEVER, Mgr.
Pottsville Building Block Co.
Pottsville, Pa.

Additional information on this installation will be furnished on request.

Built extra sturdy



NO-BLIND SCREEN

THE ORIGINAL
DEISTER CONCENTRATOR COMPANY
Incorporated 1906
911 Glasgow Ave. Ft. Wayne, Ind.

We also manufacture Sand Classifiers and the Deister Overstrom Diagonal Deck Washing Table for sand and gravel, which produces a premium product at minimum cost—handling from 18 to 40 tons per hour.

Write for Bulletins

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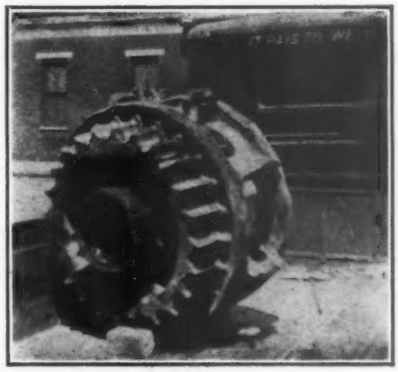
11% to 14% Manganese Steel Parts

Weld Deposit of 550-600 Brinell Hardness



Giant gear with worn parts restored with Manganal Applicator Bars

APPLICATORS (Filler) BARS
WELDING ELECTRODES
FORGED WEDGES
WEDGE BARS

Giving old equipment a new lease on life—by rebuilding worn-away parts or restoring surface hardness—that is the job of S-S welding products. It is also your answer to the problem of reduced maintenance and needless replacements. Applicator Bars are used where depositions of large amounts of metal are required, as in jaw crushers, bucket lips and pump shells. Seaco Hard Surfacing Electrodes are applied as a finishing layer over a Manganal Applicator build-up. It permits the underlying metal to work-harden for greater resistance to impact and abrasion. Write for bulletins, giving complete details.

STULZ-SICKLES COMPANY
NEWARK, NEW JERSEY

Refer your welding problems to S-S engineers.

BUYERS' GUIDE

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*Hardinge Co.

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*Link-Belt Co.
Smith Engr. Works

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*Fairbanks, Morse & Co.
Merrick Mfg. Co.
*Howe Scale Co.

Scales (Track and Truck)
*Fairbanks, Morse & Co.
Merrick Mfg. Co.
*Howe Scale Co.

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American Manganese Steel Co.
Chain Belt Co.
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Pettibone-Mulliken Co.

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*Austin-Western Road Machy. Co.
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
*Harnischfeger Corp.
*Koehring Co.
*Lima Locomotive Wks., Inc.
*Link-Belt Co.
Michigan Power Shovel Co.
Northwest Engr. Co.
Thew Shovel Co.

Silos
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*Smidth & Co., F. L.

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Huron Industries Co.
Iowa Mfg. Co.
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*Portable Machy. Corp.

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*Jeffrey Mfg. Co.
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Marietta Concrete Corp.
*Sauerman Bros., Inc.

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*Allen-Sherman-Hoff Co.

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*Hendrick Mfg. Co.
*Link-Belt Co.
*Portable Machy. Corp.

Tanks (Sand-Settling)
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*Jeffrey Mfg. Co.
*Link-Belt Co.
Smith Engr. Works

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*American Steel & Wire Co.
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*Allis-Chalmers Mfg. Co.

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*Gruendler Crusher & Pulverizer Co.
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*Link-Belt Co.
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Underground Loaders
*Allis-Chalmers Mfg. Co.

Unloaders (Box Car)
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*Fuller Co.
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*Portable Machy. Corp.

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Cross Engr. Co.
*Hendrick Mfg. Co.
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*Link-Belt Co.
Manganese Steel Forge Co.

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*Jeffrey Mfg. Co.
*Tyler Co., W. S.

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*Koehring Co.
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Iowa Mfg. Co.
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*Link-Belt Co.
McLanahan and Stone Corp.
*Pioneer Gravel Equip. Mfg. Co.
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*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.
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*Fuller Co.
*Howe Scale Co.
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Welding and Cutting Equipment
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*American Steel & Wire Co.
*Harnischfeger Corp.
Manganese Steel Forge Co.
*Roeblings Sons Co., John A.
Stulz Sickles Co.

Well Drills (See Drills—Well)

Wheels (Car)
American Manganese Steel Co.
*Eagle Iron Works
Iowa Mfg. Co.
Pettibone-Mulliken Co.

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Winches and Capstans
Chain Belt Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
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Wire and Cable (Electric)
*Roebling's Sons Co., John A.

Wire Cloth
Audubon Wire Cloth Corp.
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Cleveland Wire Cloth & Mfg Co.
Ludlow-Saylor Wire Co.
Manganese Steel Forge Co.
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Tyler Co., W. S.

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Buffalo Wire Works Co.
*Hazard Wire Rope Co.
*Leschen & Sons Rope Co., A.
*Roebling's Sons Co., John A.
Union Wire Rope Corp.
*Williamsport Wire Rope Co.

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*American Steel & Wire Co.
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*Page Engr. Co.
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*Williamsport Wire Rope Co.

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American Cable Co.
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*Hazard Wire Rope Co.
*Leschen & Sons Rope Co., A.
*Roebling's Sons Co., John A.
Union Wire Rope Corp.
*Williamsport Wire Rope Co.

Wire (Welding)
American Manganese Steel Co.
*American Steel & Wire Co.
Manganese Steel Forge Co.
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Worm Gears (See Gears and Pinions)

* See also information in the 1936 Pit and Quarry HANDBOOK.

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- **Only a dependable truck mixer can make money for you.**
- **Dependable—in that it can be relied upon to consistently produce and deliver concrete of high, uniform quality for any mix that may be specified or desired.**
- **Investigate Blaw-Knox TRUKMIXERS for your future profits.**

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2080 Farmer's Bank Building · Pittsburgh, Pa.
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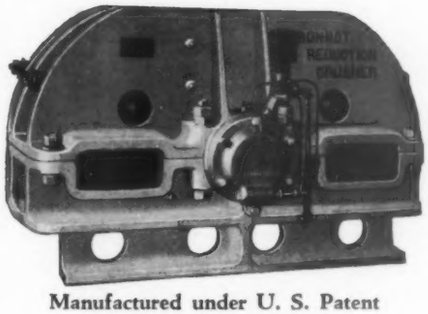
BONNOT
REDUCTION CRUSHERS



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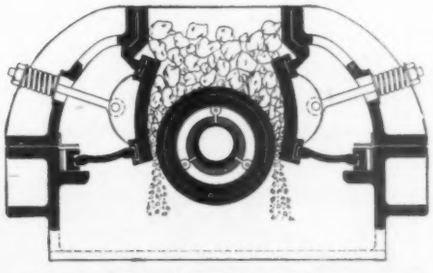


Showing Slow Creep Mantle for Uniform Distribution of Wear

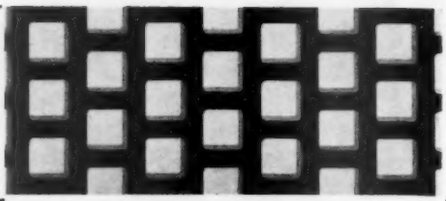
Actual performance in the field, whether in the far West, Eastern or Central States, on hard material, wet or dry, producing 100% through ¾", offers proof of the ruggedness and capabilities of the Bonnot Reduction Crusher. Check these features:

1. **Will produce 100%—¾" minus material;**
2. **Will handle either wet or dry material;**
3. **Will operate under full choke load;**
4. **Can be started fully loaded;**
5. **Lowest power, operating and maintenance costs.**

Write for bulletin No. 160.

BONNOT CO.
CANTON, OHIO
NEW YORK—30 Church Street
Offices in Principal Cities

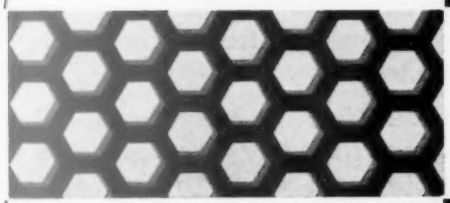
CROSS PERFORATED PLATES



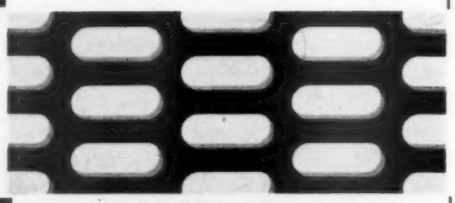
ROUND HOLES
for accuracy and wear

For Vibrating, Rotary and Shaking Screens

SQUARE HOLES
for maximum capacity



Long wearing, accurately made, trouble free screen plates; the kind that save money and time, and are vital when full production is demanded. Submit your sizing problems to us.



HEXCREEN HOLES
the best combination of accuracy, capacity and wear

ECONOMY WEARABILITY EFFICIENCY

SLOTTED HOLES
for special conditions. All screens corrugated and heat treated when required

Sales Representatives in principal cities

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MAIN OFFICE AND MFG. PLANT
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fast!

"FOR HIGH SPEED WORK, GIVE ME A MICHIGAN!"

I've run lots of shovels in my time and I know what a real day's work with the ordinary type means, too! That's why I'm strong for the MICHIGAN . . . For several years now, the boss has bought MICHIGAN Truck Shovels for the high speed jobs. He knows that Michigan's AIR CONTROLLED CLUTCHES are faster, and they keep his operators at top efficiency without fatigue ALL DAY . . . Fingertip Air Controls are not new with the MICHIGAN. Their dependability has already been proved by **seven years** of actual use.

AIR CONTROLS are but ONE feature—
Write for the MICHIGAN DATA BOOKLET "P" today.

Michigan Truck Shovel—3/8 yard capacity—25 m. p. h. road speed

MICHIGAN POWER SHOVEL CO.
MILLER ROAD
BENTON HARBOR MICH.

SPECIALISTS DUST & FUME CONTROL

FOR MORE THAN A QUARTER OF A CENTURY

Every phase of Dust and Fume control has been studied by Engineers of this Corporation during more than a quarter of a century. Various types of equipment designed and installed by us to meet specific conditions have resulted in aggregate savings of millions of dollars to industry during this period. This experience and the equipment available are offered to any organization that has a dust problem.

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Multiclones are a system of small tubular separators in which the centrifugal force is hundreds of times stronger than gravity. All-metal, fireproof, compact, flexible as to capacity and highly efficient, Multiclones require minimum operating and maintenance expense. They have the double purpose of cleaning waste gases from boilers or furnaces or exhaust gases from crushers, kilns or other apparatus, and separating dry powders in commercial production processes.

COTTRELL ELECTRICAL PRECIPITATORS

Used internationally for cleaning waste gases and recovering valuable materials in smelters, cement plants, petroleum refineries, gas and coke works, paper mills and various chemical industries. Efficiencies as high as 99 plus percent have been obtained. Every important copper smelter in the United States and Canada is provided with a Cottrell process department.

We will be glad to consider your dust problems

WESTERN PRECIPITATION CORPORATION

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Precipitation Co. of Canada, Ltd., Dominion Square Bldg., Montreal
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Low cost lifting up to 10 tons. Costs no more than chain block. Laborer can spot accurately. Abuse-proof. Can't be damaged by overload. Rugged, long-lived.

CURTIS AIR POWER CRANES

Speed Production, Cut Labor Costs. Large wheels, roller bearings, unusually easy running. Pressed steel ends. Costs less to buy.

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THEY CHOSE THE HIGHEST PRICED SCALE

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The Merrick Weightometer was preferred by several recent purchasers for weighing conveyor handled rock into vessels because it is the only continuous integrating conveyor scale that is universally accepted for commercial weighing proven by official certificates from many Governments and successful performance for over twenty-five years in hundreds of industrial plants as an acceptable weighing instrument for purposes of trade.

The best is none too good for such duty and its cost is less per year of service.

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186 Autumn Street
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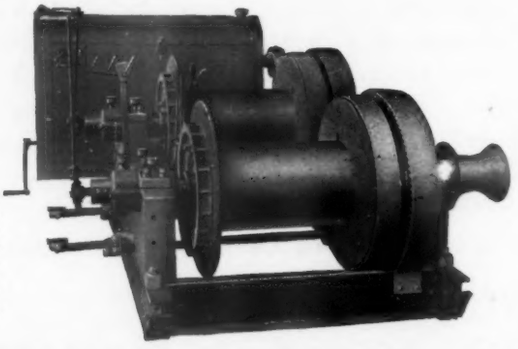
MERRICK CONVEYOR WEIGHTOMETER

OK for Profits in 1937

You can depend on OK Portable Compressors for rapid air-tool work that insures maximum profits on every job.

Start the year with equipment that has a proved record for results. Industry has put its OK unanimously on OK Machinery for dependable performance under the hardest kind of service. OK portable Air Compressors, powered with Hercules engines and equipped with efficient air cooling system, automatic lubrication, positive acting valves, easy air regulation, will back up your promises on the toughest jobs, and keep down operating and maintenance costs to the lowest figure.



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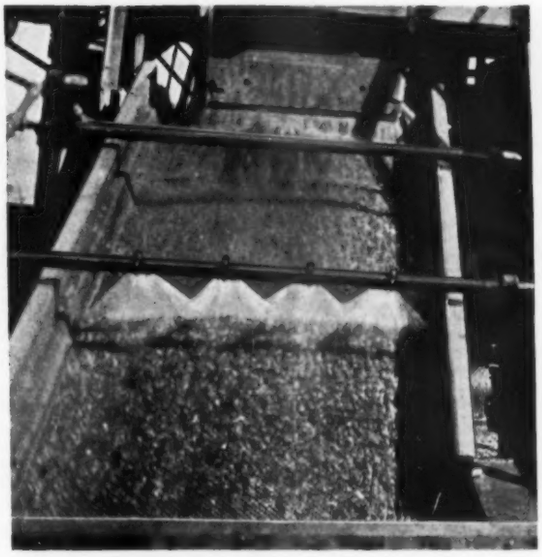
C-36-3-½

LINK-BELT *VIBRATING* SCREEN

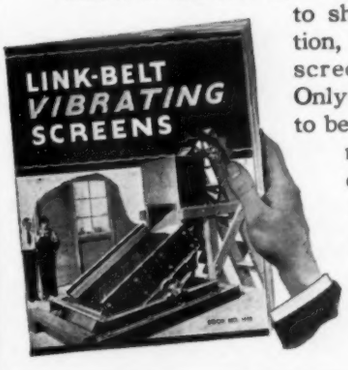
... for ACCURATE SCREENING AND SIZING . . . . .



Link-Belt "PD" Heavy-Duty double deck Vibrating Screen

● Link-Belt "UP" Unbalanced-Pulley Type Screens have successfully handled most of the finer-screening problems, while for the large screen openings and heavier capacities, the Link-Belt "PD", Heavy-Duty, Positive-Drive Type Screen should be used.

The vibrator shaft actuating the screen box of "PD" screens is eccentrically journaled at the inside bearings. Long leaf springs maintain the screen box at any given angle, and carry part of the load. Mechanism is provided for quickly changing the screening angle to suit screening conditions, but the eccentricity of the drive, or throw of the screen, is fixed at the factory prior to shipment and installation, to suit the specific screening requirement. Only the screen cloth needs to be removed when cloth replacements are required.



Send for Book No. 1562. Address Link-Belt Company, Philadelphia, Chicago, Indianapolis, Atlanta, San Francisco, or any of our offices located in principal cities. 5906

RELIANCE

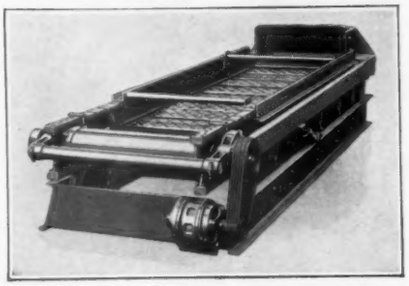
Small, compact and inexpensive, the screening and washing plant pictured above is the ideal answer to the sand and gravel producer who must produce quality materials in relatively small quantities. These plants are supplied in two sizes—the smaller having a capacity of 30-40 tons per hour, the larger 40-70 tons per hour, depending on the nature of the material. The smaller plants are especially suited to produce materials in local demand. Small road jobs can also be undertaken provided the operator has time to accumulate stockpiles in advance of deliveries. The larger plant can easily handle a good sized road job with sufficient extra capacity to handle local work as well. The plant illustrated utilizes a self-cleaning bin, although any type of bin may be used.

Universal Road Machinery Co.

Kingston, N. Y.

COMPLETE CRUSHING, WASHING AND SCREENING EQUIPMENT FOR QUARRIES AND PITS . . CAPACITIES FROM 100 TO 1500 TONS PER DAY

SYMONS SCREENS



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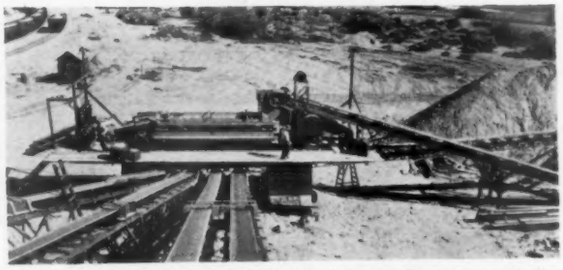

At Hawley plant of Colorado River Aqueduct, Symons Screens are separating 200 tons per hour into four graded sizes

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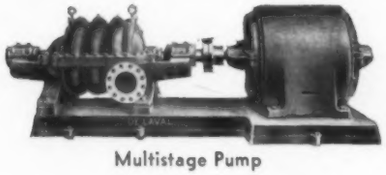
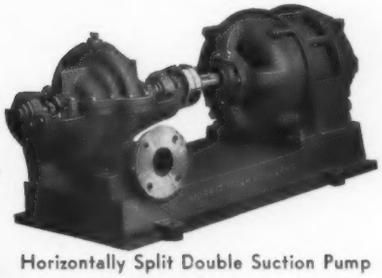
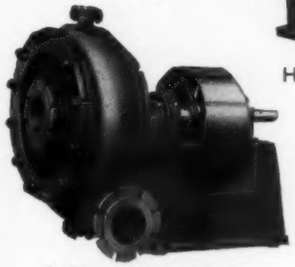
Vertical Non-clogging Pump



Multistage Pump



Horizontally Split Double Suction Pump



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Slurry or Sludge Pump

57 Varieties . . . .

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For authoritative recommendations on any pumping or dredging problems, write to Morris Machine Works, Baldwinsville, N. Y. Representatives in principal cities.

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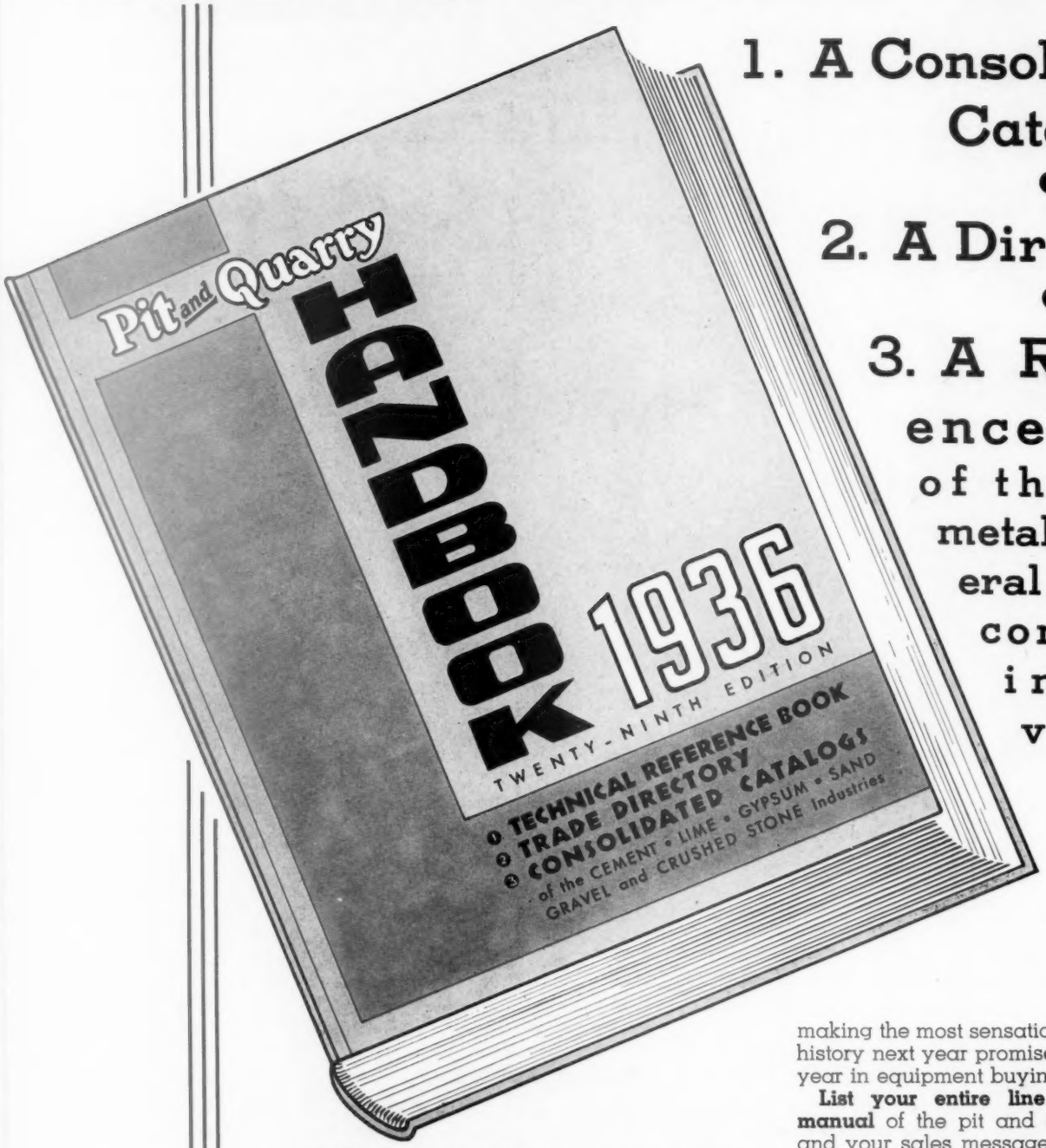

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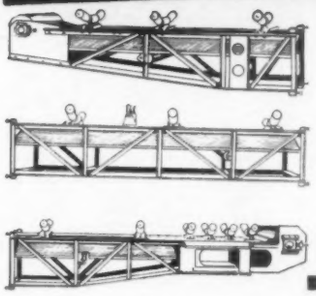

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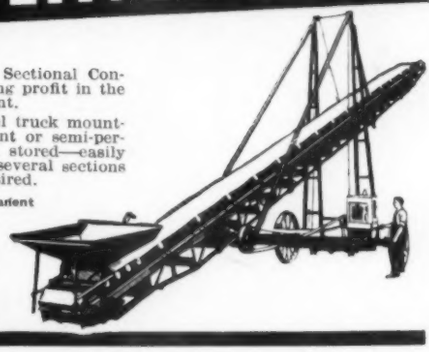
Our Catalog describes our complete line of Portable, Sectional and Permanent Conveyors designed to suit every Pit and Quarry requirement.



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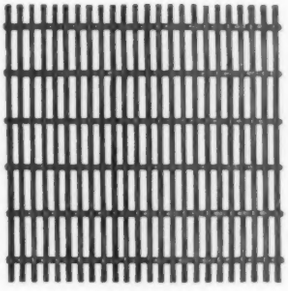

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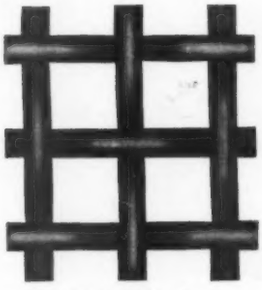
Available in Square Mesh and Rolled Slot. A trial will convince you of the superiority.



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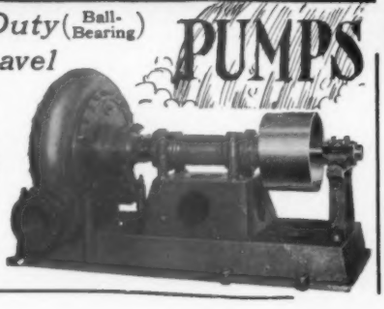

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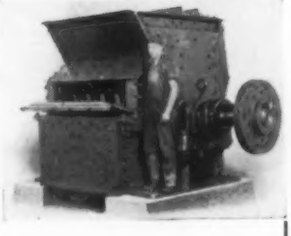

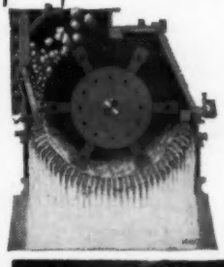

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The Jeffrey Manufacturing Co.

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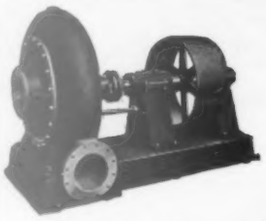

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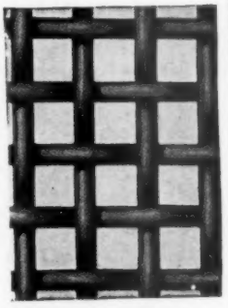

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- ☐ Pulverized Fuel Systems
- ☐ Pulverizers, Ball, Conical Pebble
- ☐ Pulverizers, Disc
- ☐ Pulverizers, Hammer
- ☐ Pulverizers, Ring
- ☐ Pulverizers, Rod
- ☐ Pulverizers, Roll
- ☐ Pumps, Centrifugal
- ☐ Pumps, Deep Well
- ☐ Pumps, Sand and Gravel
- ☐ Pumps, Slurry
- ☐ Pumps, Steam
- ☐ Radiators, Engine Cooling
- ☐ Rails
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- ☐ Rope, Wire
- ☐ Safety Appliances
- ☐ Sand-Lime-Brick Machinery
- ☐ Scales, Track
- ☐ Scales, Truck
- ☐ Scrapers, Dragline
- ☐ Screens, Revolving
- ☐ Screens, Shaking
- ☐ Screens, Vibrating
- ☐ Separators, Air
- ☐ Separators, Dry Centrifugal
- ☐ Separators Magnetic
- ☐ Shovels, Gasoline
- ☐ Shovels, Steam
- ☐ Skips
- ☐ Sleeves, Dredge
- ☐ Slugs and Nuggets, Grinding
- ☐ Speed Reducers and Gears
- ☐ Spray Nozzles
- ☐ Sprays, Paint
- ☐ Sprockets
- ☐ Steel, Tool
- ☐ Stokers
- ☐ Switches, Track
- ☐ Tanks, Concrete and Steel
- ☐ Tanks, Sand Settling
- ☐ Tanks, Wood
- ☐ Thickeners, Slurry
- ☐ Track, Portable
- ☐ Track Shifters
- ☐ Tractors, Crawler
- ☐ Tramways, Aerial
- ☐ Trippers, Belt
- ☐ Trippers, Tramway
- ☐ Unloaders
- ☐ Valves, Pump
- ☐ Washers and Scrubbers, Sand, Gravel, Stone
- ☐ Weighers, Automatic
- ☐ Welding Supplies
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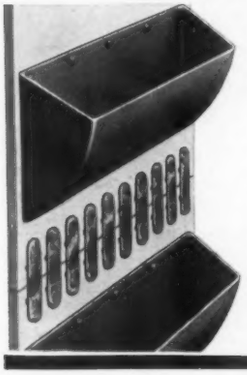
•A Tight Butt Joint•

for long life of Conveyor and Elevator Belts



Note how recessed plates compress belt end. Internal friction and ply separation in belt ends is overcome. The tight butt of the belt ends prevents passage of materials or liquids through the belt. Made in steel, "Monel Metal," non-magnetic and abrasion resisting alloys. Five sizes. Sold by jobbers and belting houses. Consultation regarding belt joining invited.

Sole Manufacturers
FLEXIBLE STEEL LACING CO.
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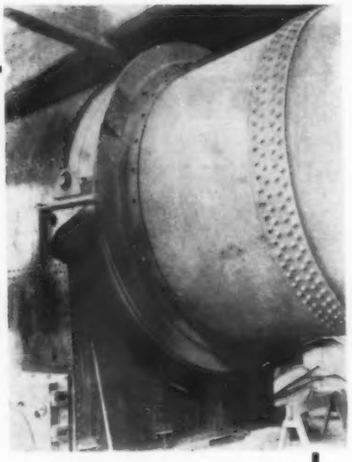
KILN EFFICIENCY

Increased from 7 to 12% with

HURON SEAL RINGS



Huron Seal Rings provide a practical and effective means of sealing joints between the revolving and stationary parts of rotary kilns, dryers and coolers.

Savings in fuel, elimination of dust losses and better temperature control increase the efficiency of the kiln 7 to 12 per cent. Savings also are effected in labor and maintenance.

Write for bulletin describing Huron Seal Rings, their installation and results that can be expected.

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give you the most modern type of construction and equipment to insure maximum efficiency in handling and storing bulk materials. The services of experienced engineers, specializing in storage plant design, are available to you in working out the most economical methods of operation—for COAL, SAND, GRAVEL, LIME and other materials. Let Marietta modernize your plant and put it on a big paying basis.

Catalog sent on request.

The Marietta Concrete Corp.
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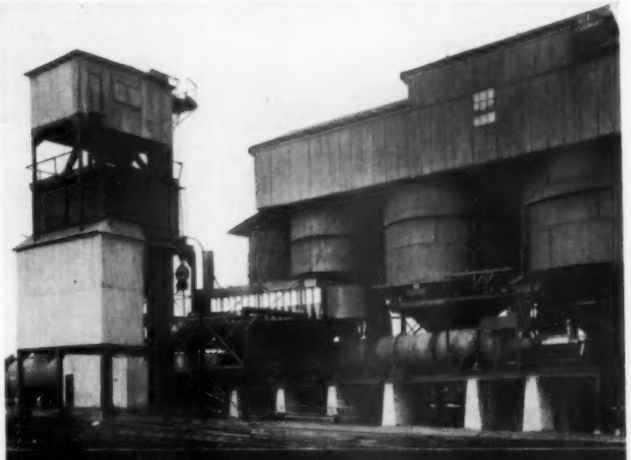


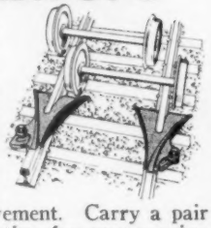
WARREN ASPHALT PLANTS

HOT MIX —— COLD MIX
—— OR ——
COMBINATION UNIT FOR BOTH TYPES

CAPACITY DESIGN AND ARRANGEMENT TO MEET ANY REQUIREMENTS

Designed and Built
—— By ——
WARREN BROTHERS ROADS CO.
P. O. BOX 1869
Boston Massachusetts

"Anchor" Rerailers



The most practical Rerailer on the market. Are used in pairs. Rerails wheels from either side at once. Retracks several derailed cars at one movement. Carry a pair on every locomotive for emergencies.

THOUSANDS IN USE ALL OVER THE WORLD

Patented locking cam holds Rerailer in place; prevents slipping. No tools needed. Easily handled by one man. One size Rerailer fits six rail sizes. Long lasting. Low priced. Immediate shipment.

EDELBLUTE MANUFACTURING COMPANY
Reynoldsville, Penna.

2—Ruggles Class XA-14—90"x50' Dryers. New 1930. Very good condition. Complete.
2—Ruggles Class A-11—72"x45' Dryers. Condition good. Complete.
4—Fuller Mills, 42" Gear Drive.
2—6" Type E Fuller Kinyon Pumps.
4—No. 60 Bailey Feeders. Complete.
8—No. 80 Bailey Feeders. Complete.
1—4'x8' Niagara Double Deck Screen. Texrope Drive.
3—No. 11 Type PB Blowers.
1—50 H.P. James Speed Reducer, 685 to 90.
1—50 H.P. James Speed Reducer, 685 to 101.5.
1—Complete Multiclone Dust Collector. New 1935. Four units.
1—Type SA Atlas Imperial Flywheel Alternator, 125 KVA, 100 KW 480 Volt, 3 phs., 60 cyc., 327 RPM (New).
2—5000/5 Amp. General Electric Transformers for 3000 KW Generator (New).
3—Ding's Magnet Pulleys.
1—Myer Whaley No. 4 Shovel. Very good.
1—375 H.P. Westinghouse Motor, Type HF, 580 RPM, 3 phs., 60 cyc., 440 Volt.

This list of equipment is really priced at bargain values.

IRON & STEEL PRODUCTS, INC.
"Anything so long as it contains Iron or Steel"
Railway Exchange, Chicago, Ill.

FOR SALE

1—20" AMSCO, Dredging Pump, 1000 H.P., 2300 V. motor.
1—C-1 Koehring Shovel, ¾ Yd.
5—1½ yd. 701 Lima Draglines.
2—20-ton 100' Boom Steel Stiffleg Derricks and 100 H.P. 3-drum Electric Hoists.
3—500 cu.ft. Chicago Pneu. Air Comp.
2—807 ft. Ingersoll-Rand XCB Compressor.
528 ft. Ingersoll-Rand Air Compressor.
1—1000 ft. Chicago Pneu. Diesel Air Compressor.
1—1052' Ingersoll-Rand XCB Compressor.
60 H.P. Clyde 2-speed Gas Hoist.
6—4", 6", 8" Centrifugal Pumps.
24"x400' Belt Conveyor, 16"x100', 22"x600'.
½ yd., ¾ yd., 1 yd. and 2 yd. Clamshells.
2—2 yd. Meade-Morrison Clamshell Buckets.
3—Hayward ¾ and 1 yd. Orange Peels.
6—12 and 14 ton 36" Gas Locomotives.
30—Western 4 yd. and 5 yd. Dump Cars.
15—2 yd. V. Shape Standard Gauge Dump Cars.
1—4'x12' Telsmith Vibrating Screen.
3—60 H.P., 3 ph. 60 c., 220-440-v. Elec. Motors.
1—Sauerman 1 yd. Elec. Elec. Drag Scrapers.
1—35 H.P. ½ yd. Gas Scraper.
1—Telsmith No. 5 Crusher.
1—6 ton Universal Truck Crane.
1—90 H.P. Fairbanks-Morse Diesel.
1—125 H.P. 6 cyl. Hall-Scott Gas Engine.

COAST-TO-COAST STEEL & EQUIP. CORP.
101 W. 31st Street — New York, N. Y.

1—Blaw-Knox bin, 5 compts., 150 yds., weigh batchers.
1—Butler bin, 3 compts., 100 yds., weigh batchers.
1—Batcher plant, Butler 125 yds., 3 compts., with weigh batch meters, cement bin, screw conveyor, etc.
1—Northwest No. 7 gas crane, 1¾ yds. cap. 70' boom.
1—Lima comb. 1½ yd. shovel, 55' crane boom.
1—Loraine comb. 1¼ yd. shovel and crane.
1—Loraine gas shovel, 1½ yd.
1—Byers gas 1 yd. Model 100 shovel and crane.
2—Osgood heavy duty steam, 1¼ yd. shovels.
1—Browning truck crane on Mack truck.
2—Locomotives, gas, 20 tons, 36" ga. Whitcomb.
1—Locomotive, gas, 20 tons, 36" ga. Vulcan.
1—Locomotive, gas, 4½ tons, 36" ga. Vulcan.
25—Cars, 5 yards, two way dumps, 36" ga.
10—Cars, 2 yds., steel V dump, 36" ga.
Conveyor belt systems, 20", 22", 30" complete.
50—Rock drills, DCR-23, X59, X49, S70, others.
10—Concrete breakers, pneumatic.
30—"BARRE" pneumatic carving tools, BL, CL, DL.
1—Bucket elevator, 32'.
1—Air compressor, 514 cfm, 14" x 12", electric drive.
1—Air compressor, 900 cfm, Deisel drive, Worthington.
1—Air compressor, 1,200 cfm, I. R., type PRE-2, elec.
1—Screen, Telsmith vibratory, 4' x 12', 5 h.p. motor.
5—Motor trucks, 5 yards, dump.
2—Derricks, steel stiff legs, 15 tons, cap. 100' booms.
4—Derricks, steel guy, 7½ tons cap., 75' booms.

Send us your inquiries for used equipment.
We buy, sell or liquidate complete plants.
Richard P. Walsh Co., 30 Church St., New York City

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5 Link Belt 2 ft. Sand Classifiers.
42 ton Baldwin S.T. Locomotive.
20 ton Browning Locomotive Crane.
½ yd. Speeder Cat. Gas Shovel.
3—60 HP 3 P., 60 C., 440 V. Elec. Motors.
8000 & 12000 gal. Steel Storage Tanks.
300 Robbins 30 In. Troughing Idlers.
60 HP Portable Fire Box Boiler.
60, 80, 180 and 360 HP Diesel Engines.
4—750 HP Busch Sulzer Diesel Units.
1¼ Yd. Thew Steam Shovel.
8—3 Yd. Koppel V. 36 G. Dump Cars.
30—1½ Yd. 36 G. V-Dump Cars.
5 Ton Whitcomb 36 G. Gasoline Locomotive.
12—2 yd. Std. Ga. V-Dump Cars.
750-1250-1800-2500 Yd. Asphalt Plants.
36x18, 30x15, 24x13, 30x10, 60x84 Jaw Crushers.
Traylor 4-10TZ Reduction Crusher.
18 In. and 24 In. Symons Disc Crushers.
Portable Air Compressors: 110-220 & 320 Ft. Cap.
Orange Peel Buckets: 5 ft. to 48 ft. cap.
10 In., 13 In. & 36 In. Superior McCully Crushers.
No. 5 Telsmith Gyratory Crusher.
150 Ton, 50 Ft. RR Track Scale.
10 Ton 85 Ft. Boom Guy Derrick.
3—100 HP 3 Drum Electric Hoists.
3—15 Ton 100' Boom Stiff-legged Derricks.
3300 ft. I.R. Class PRE-2 Elec. Air Compressor.
2040 ft. I.R. Class PRE-2 Elec. Air Compressor.
676 Ft. Worthington Duplex Elec. Air Compressor.
5" B Fuller-Kinyon Cement Pump.
10" and 7" Newhouse Crushers.
Penna. Type 5 Hammermill, 120 HP.
Mundy Derrick Swinging Engine.
5 yd. Monighan Diesel Dragline.
2 yd. 50-B Diesel Dragline.
14 Hummer Screens 4x5 to 4x12.
22x80 Vertical Bucket Elevator.
18 in. by 30 ft. Pan Conveyor.
36x16 Kennedy Double Rolls.
Buchanan 30 Inch Magnetic Pulley.
85 KW 250 V., DC., 220 V., AC M.G. Set.
5 Lambert 7x10 & 8¼x10 Steam Hoists.
30 In. by 10 ft. Feeder & Mag. Pulley.

COMPLETE PLANTS BOUGHT & SOLD
R. C. STANHOPE, INC.
875 Sixth Ave., — New York, N. Y.

FOR SALE

AMERICAN 70 ton 6-wheel switching locomotive with separate tender, 20x26" cylinders.
AMERICAN 50 ton 4-wheel saddle tank locomotive, 16x24" cylinders.
AMERICAN 40 ton 4-wheel saddle tank locomotives, 14x22" cylinders, six duplicates.
AMERICAN 30 ton 4-wheel saddle tank locomotive, 12x18" cylinders.
BALDWIN 75 ton 6-wheel switching locomotive with separate tender, 21x26" cylinders.
BALDWIN 55 ton 4-wheel saddle tank locomotive, 18x24" cylinders.
BALDWIN 40 ton 4-wheel sadd'e tank locomotives, 14x22" cylinders, three duplicates.
PORTER 36 ton 4-wheel saddle tank locomotives, 14x20" cylinders, two duplicates.
VULCAN 33 ton 4-wheel saddle tank locomotives, 13x18" cylinders, two duplicates.
VULCAN 21 ton 4-wheel saddle tank locomotive, 11x16" cylinders, six duplicates. 36" gauge.

Complete stock list on request.

BIRMINGHAM RAIL & LOCOMOTIVE COMPANY
Birmingham — Alabama

SPLIT BUSHINGS

Machinery Spacer Tubes
Roller Bearing Sleeves

GIFFORD ENGINE COMPANY
Eaton Rapids, Mich.

Belt Idlers & Pulleys from 16" to 36" wide.
18" Conveyor Equipment with 110' 6-ply belt.
16" Conveyor Equipment with 70' 7-ply belt.
14" Conveyor Equipment with 100' 4-ply belt.
Portable Electric Scoop Conveyor, 14"x24'.
60' Belt Elevator with 24" Steel Buckets.
60' Belt Elevator with 36" Steel Buckets.
Haiss Digging Bucket Loader on wheels.
Jeffrey 23 Combination Jaw Crusher-Hammermill.
Farrel Jaw Crusher, 42"x40", type E.
Kennedy 37 Gyratory Crusher with 75 HP motor.
Reliance 9"x16" Jaw Crusher.
Acme 10"x42" Jaw Crusher.
Revolving Stone Screen 20' long and 4' diam.
Jigger Selectro 3-Deck 3x8' New Vibr. Screen.
10 Hummer Electric Vibr. Screens, 1 & 2-deck.
Hummer Screen Generators, 8-KVA, 15 cycle.
Centrifugal Electric Pump, 150-gals., 150' head.
Goulds Centrif. Pump, 1000-gals., 22 HP Motor.
Domestic 6" Centrifugal Pump, 1000-gallons.
Fairbanks-Morse Belted Centrif. Pump, 375-gals.
Morris 8" Dredge Pump, no power.
Locomotive Boiler, 100 HP, 125 lbs., on skids.
Johnston Locomotive Boiler, 50 HP, 125 lbs.
Clamshell Material Buckets, ¾—1—1¼—1½ yds.
Plymouth Gasoline Locomotive, 36"-g., 4-ton.
Mundy 2-Drum Hoist, 25 HP. Slip Ring Motor.
Mundy 2-Drum Hoist, 35 HP. Buda Gas Engine.
Clyde 2-Drum Hoist, 100 HP. Slip Ring Motor.
I. R. Belted XB Air Compressor, 446 C. F. M.
I. R. Belted XCB Air Compressor, 676 C. F. M.
I. R. Belted Vertical Compressor, 44 C. F. M.
Schramm Compressor Unit, Tank & 15 HP motor.

G. A. UNVERZAGT, 15 Park Row, New York City

EQUIPMENT FOR SALE CHEAP

1—Vulcan 40 ton Std. Ga. Saddle tank locomotive.
1—Marion 1 yd. Steam crane 40' boom on cats.
1—Marion 15 ton gas crane 40' boom.
1—Link-Belt K-2 crane 50' boom, 15 ton capacity.
1—Link-Belt K-44 shovel 50' boom, fairleads.
1—Lorain 75 B 1¼ yd. chain crowd shovel.
2—Plymouth 8 ton 36" Ga. locomotives.
2—Chicago Pneumatic Compressors, 590 cu. ft., 100H.P. G.E. Motor.
2—Worthington Compressors, 621 cu. ft., 75 H.P. motors.
1—Monarch 75 Caterpillar with bulldozer.
1—Sullivan 310' portable compressor.
1—Ingersoll-Rand pavement breaker.
6—Easton 4 yd. all steel 36" Ga. cars.
15—2 wheel concrete buckets.
1—Ransome 27 E Paver.
2—No. 116 Chicago Pneumatic Paving Breakers.
2—1 yd. Insley bottom dump concrete buckets.
1—1 yd. Steubner bottom dump concrete bucket.
1—1 yd. Kiesler rehandling bucket.
1—¾ yd. Browning clamshell bucket.
1—¾ yd. Blaw-Knox bucket.
1—Le Courtney 6" Cent. Pump, 40 H.P. motors.
1—Morris 8" dredge pump 150 HP. GE. mtr.
1—Morris 10" cent. pump 2250 GPM at 130' head.
1—Goulds 12" cent. pump 50 HP. GE. motor.
1—Thompson 6" self priming pump Waukesha motor.
2—Gardner Denver Sheeting Hammers.
2—Humdinger 6" self priming pumps, gas motor.
1—Humdinger 4" self priming pump.
1—Humdinger 2" self priming pump.
1—Domestic double diaphragm pump gas mtr.
1—GE. motor 200 HP. sliprings.
2—No. 9 H 2 McKiernan-Terry Hammers.
3—No. 5 McKiernan-Terry Hammers.
3—No. 7 McKiernan-Terry Hammers.

HARRY C. LEWIS
325 Frelinghuysen Avenue — Newark, N. J.

TRUCK MIXERS

For Rent or Sale

Separate Engine Drive

1 Blaw Knox 2 yd.—factory rebuilt
2 Jaeger 1½ yd., in good condition

Truck Engine Drive

3 Jaeger 2 yd., mounted on GMC chassis

EDWARD EHRBAR, Inc.
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STORAGE BATTERY LOCOMOTIVES

2-6½ ton, Mancha, 42" gauge, low vein, with Wotton Battery Charger, rebuilt and in A-1 condition, attractive price.

INDUSTRIAL EQUIPMENT CORP.

Dealers in complete line of equipment for quarries.

Stock list upon request.

Warehouse — **P. O. Box 1647**
CARNEGIE, PA. — **PITTSBURGH, PA.**

"E. C. A. Rebuilt" Quarry & Gravel Plant Equipment

AIR COMPRESSORS

Portable and stationary, belt, with elec. or gas power, sizes from 21 cu. ft. to 1,000 cu. ft.

BINS

8—Bins: 2—Blaw Knox 118 ton; 1—Blaw Knox 117 ton with weigh batchers; 1—Butler 75 yd. with weigh batchers; 2—Johnson 76 yd. and 54 yd.; 2—Blaw Knox 72 ton with or without weigh batchers, all 2 compartment.

BUCKETS

1—4 yd. Hayward Class "G" Clamshell.
34—Williams, Blaw Knox, Owen clamshell buckets, all sizes and types.
5—Dragline buckets: 1—Northwest 1¾ yd., 2—Page 1½ yd., 1—Omaha 1½ yd., 1—Blaw Knox 1 yd.

CABLEWAY EXCAVATOR and DRAGSCRAPER OUTFITS

6—Dragscraper buckets from ½ cu. yd. to 2 cu. yd. size.
1—Thos. 150 HP DD special cableway excavator hoist No. 7671, Class L, for handling 2 yd. bucket.
1—O. K. Clutch & Machinery Co. 120 HP, 3 drum gasoline dragscraper hoist for handling 2 yd. bucket.
1—National 50 HP, 2-speed, electric dragscraper hoist for handling 1 yd. bucket.

CARS

Large lot including std. ga. 6 and 12 yd. and 20 yd., 36-ga. 5 yd. and 24-ga. 1½ yd.
16—2 yd. 36 inch ga. Continental 2-way wood body dump cars.

CONVEYORS and ELEVATORS

9—Port. belt conveyors with steel frame, gas, or elec. pr. 18 and 24 in. Barber-Greene and Chic. Automatic.
11—Bucket elevators; 6-Chain Belt Co., Weller, and Link Belt vertical enclosed type; capacities from 35 to 117 tons per hour. 5—Weller inclined type. Nos. 3, 4, 5 and 6 up to 170 yds. per hr.

CORE DRILL

1—Sullivan Model 21 Diamond core drill with hyd. feed and gasoline power. New, never used.

CRANES and DRAGLINES

1—Koehring Model 501 dragline, Serial No. 1070, 45′ boom, 1¼ yd. bucket.
1—Northwest Model 104, Serial No. 2079, 45′ boom, 1¼-yd. bucket.
2—Northwest Model 105, Serial No. 756 and 2053, 40′ boom 1-yd. bucket.
1—Link Belt Model K-1 crane, shop No. 1024, 50′ boom, 1-yd. bucket.
1—4 good heavy duty dragline, Serial No 2069.
1—Industrial Brownhoist type CC, No. 5071, 30′ boom, ½-yd. bucket.
1—Byers Bearcat crane, Model 26, Ser. 30474, half circle swing, ½-yd. bucket.
1—Erie type B-2, Serial No. 3900 steam crane, 40′ boom, 1-yd. bucket.

CRANES (Locomotives)

5—Locomotive cranes: sta. ga. 30 and 25-tons; Ohio, Browning, American, Industrial.

CRUSHERS

1—Symons coarse cone crusher, size No. 5½, SU No. 521.
1—Set P & M crushing rolls, size 42″x16″.
1—Allis-Chalmers, Style N, No. 6 gyratory No. 7755.
1—Allis-Chalmers Gates No. 5, Ser. 5331.
2—McCulley No. 3 gyratory.
1—Carroll 24″x36″ jaw, manganese fitted.
1—Champion size No. 6, 12″x26″, Ser. No. 1075.
1—Allis-Chalmers Blake type, size 10″x20″, manganese fitted, Ser. No. 3163.
1—Champion size No. 4, 9″x15″, jaw.

DERRICKS

Steel and wood, stiff leg, or guy; from 2 to 50 tons, including 3 steel stiff legs: 1—10 ton American 80 ft. boom; 1—10 ton Insley 80 ft. boom; 1—15 ton Dobbie 100 ft. boom.
3—American 20 ton guy derricks, 100 ft. booms.
3—Bedford 7 ton guy derricks, 90 ft. booms.

DREDGE

1—12″ Morris manganese dredge, 300 HP A.C. motor, all complete with 6″ jet pump, 3 drum hoist, 1000 ft. 12″ pipe and mounted on a sectional steel hull 22 ft. x 48 ft.

HOISTS

Gas, Elec. and Steam—all sizes.

LOADERS

2—Barber Greene Model 42-A, self feeding loaders, cap. 1¾-yd. per minute.

LOCOMOTIVES

32—Gasoline locomotives, from 20-ton to 2-ton, std. ga. 36″ and 24″ ga.
2—Plymouth std. ga. gas locomotives: 1—20 ton Model HL No. 2351; 1—12 ton Model JLB No. 2308.
1—Porter steam saddle tank locomotive 24-ton, cylinders 12x16; std. ga. No. 5093.

PNEUMATIC TOOLS

68—Ingersoll-Rand, Chgo. Pneu., and Thor jackhammers, concrete breakers, chipping hammers, spades, reamers, riveting hammers, wood borers, grinders and surfacers.
26—Drills (Column, Derrick and tripod mounted), Gardner Denver Models 17 and 21, IR-X71, and Sullivan Model FG3.
1—Drill Sharpener, Ingersoll Rand No. 50, Shop No. 6121.

PUMPS

4 Belt Driven Dredge pumps. 1—8″ Morris; 1—6″ Morris manganese; 1—6″ Erie; 1—4″ Morris.
2—Dayton Dowd 5″ suct. 4″ disc. centr. pumps V-belt drive to 100 HP Northwest oil engines, cap. 600 GPM at 450 ft. head.

SCREENS

2—48″x18′ P&M roller type screens.
1—60″x12′ P&M roller type screen.
1—30″x12′ Climax revolving screen.
1—Stephens-Adamson double deck vibrating screen, 3 ft. x 6 ft. suspension type.

SHOVELS

4—Gas shovels: 2—1¼ yd. Lorain 75-B Nos. 4653 and 4890, one with pull-shovel attachment; 1—1 yd. Osgood heavy duty No. 2069; 1—½ yd. Brownhoist No. 1 combination shovel and crane Ser. 10057, ½-yd. shovel front and 35 ft. crane boom.
3—Link Belt shovel attachments for K-55, K-44, K-42, K-38, K-2 machines.
7—Steam Shovels: 1—1¾ yd. Bucyrus 50-B No. 10311; 2—1½-yd. Osgood Nos. 1575-6; 1—1¼-yd. Marion 32 No. 5289; 1—1¼-yd. Bucyrus 30-B No. 3910; 1—1-yd. Erie B-2 No. 3900; 1—¾-yd. Erie B.

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FOR SALE—Complete Crushing Plant—Now Operating Diesel Power

Do you want a first class plant with actual capacity 50 to 60 tons per hour—mostly new equipment? Now leased to Government and will be available not later than March 1st. Allis-Chalmers Primary Crusher No. 5 Triple deck vibrating screen. New Diesel Engine and air-cooled compressor. New Traylor T.Y. Crusher. 100 ton bin. Elevator. A first class plant now producing low cost stone. Will be for sale as soon as our lease expires not later than March 1st. Will sell with or without Diesel Power and Compressor.

Franklin Limestone Co.
612 10th Avenue North
Nashville, Tenn.

12″ DREDGE PUMP

We have in stock, one Morris 12″ Sand Pump, Manganese steel shell and one extra new Manganese shell, two extra liners, 12″ valve and suction hose; pump on extended base with 300 HP, 2200 volt motor.

Sell cheap, with or without motor, excellent condition.

THE DENVER METAL & MACHINERY COMPANY
130 Larimer Street,
Denver, Colorado

TA. 6178

— FOR SALE —

GOOD REBUILT EQUIPMENT

2—8A Telsmith Crushers.
1—40″ Telsmith Red. Crusher.
1—4x4 A-C Centrifugal Pump.
2—40″x18′ Revolving Screens.
1—50 H.P. B.B. Sq. Cage Motor.
1—1 Yd. Drag Scraper Hoist.
1—½ Yd. Drag Scraper Hoist.
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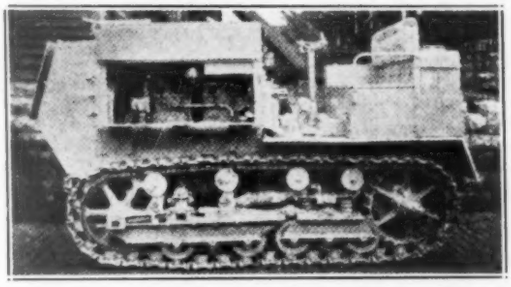

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5—Raymond Pulverizers, Nos. 0000, 00, 1, 3.

6—Raymond Imp Mills—Nos. 3, 45, 50, 55.

1—10' dia. Sturtevant Air Classifier.

2—30", 10' Gayco Air Separators.

9—Hardinge iron lined Ball Mills, 4½'x16", 5'x22", 6'x22", 7'x36", 8'x22", 8'x30".

1—No. 32 Marcy Ball Mill.

1—6'x22" Hardinge silex lined Pebble Mill.

3—42" Fuller-Lehigh Mills, UNUSED.

3—Nos. 1, 1½, 2 Sturtevant Ring Roll Mills.

3—5'x22' silex lined Gates Tube Mills.

1—3'x12' Hendy iron lined Tube Mill.

2—P. & M. 8'6" and 9'6" x 150' Rotary Kilns.

1—8'x125' P. & M. Rotary Kilns.

2—8'x110' Bonnot Rotary Kilns, and smaller sizes.

15—Direct heat Rotary Dryers, 4x20, 4x30, 5x26, 5x30, 5x50, 6x40, 6x60, 7x60, 8'x60'.

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8—Tyler Hummer Screens, 3x5, 4x5, different types.

6—3'x6' Sturtevant M.V. Screens, 2-deck.

1—5'x8' Niagara Vibrating Screen, 2-deck.

4—Magnetic Pulleys, 12x18, 14x20, 24x72".

2—No. 2 Sturtevant Rotary Fine Crushers, direct a.c. motor driven.

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450	West. Sl. Rg.	875/700
400	West. Syn.	720
400	West. Sl. Rg.	514
400	G. E. Sl. Rg.	885
300	Al. Ch. Sl. Rg.	585
250	G. E. Sl. Rg.	257
250	West. Sl. Rg.	700
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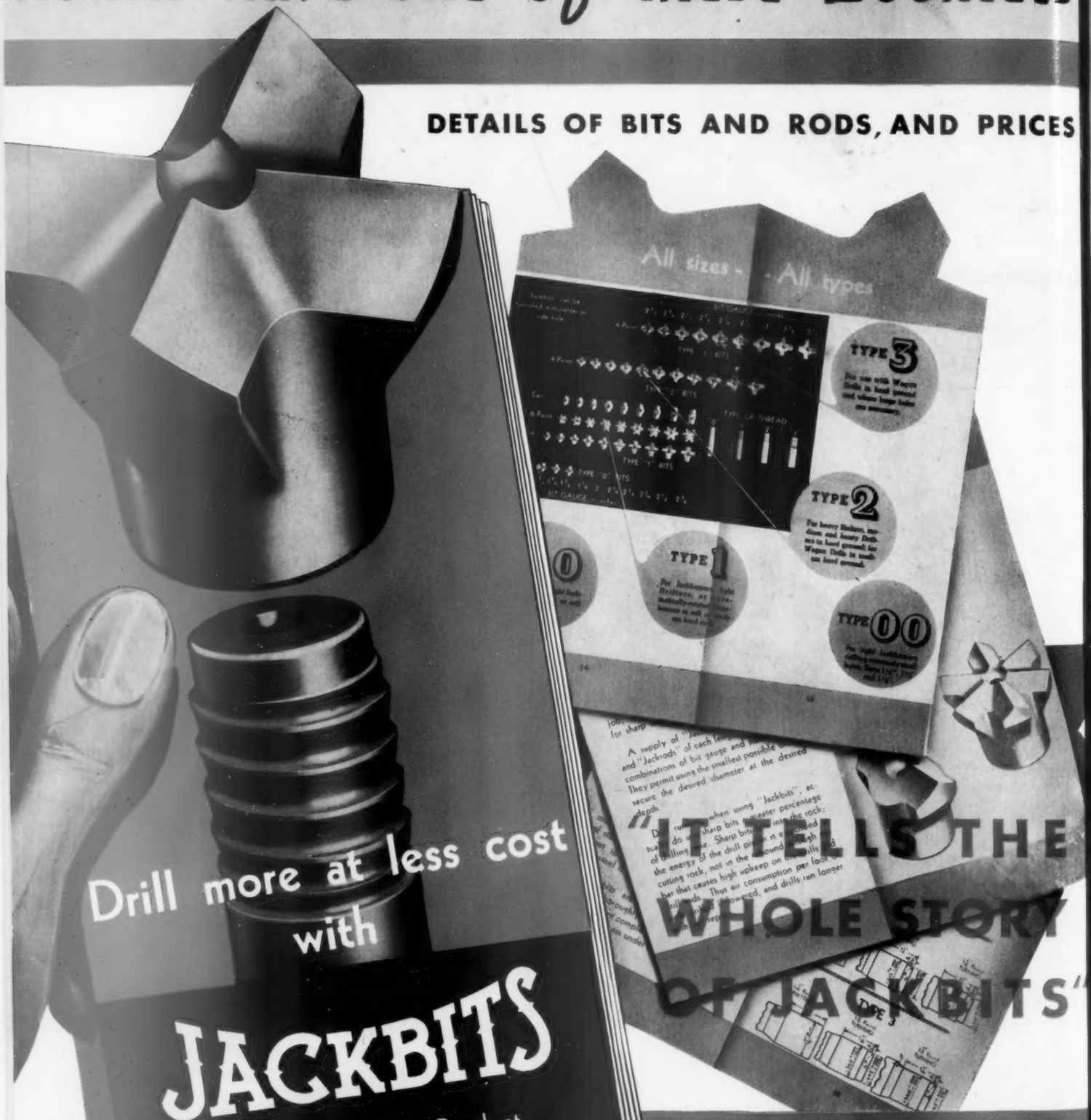

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